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WT-1444 (EX)
EXTRACTED VERSION

OPERATION PLUMBBOB

Operational Summary

360877

Headquarters Field Command
Defense Atomic Support Agency
Sandia Base, Albuquerque, New Mexico

23 February 1960

Nevada Test Site
May—October 1957

Approved for public release; distribution unlimited.

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Extract version prepared for:
Director
DEFENSE NUCLEAR AGENCY
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1 October 1979

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Desert Rock VII
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Nuclear Tests

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FOREWORD

This report has had classified material removed in order to make the information available on an unclassified, open publication basis, to any interested parties. This effort to declassify this report has been accomplished specifically to support the Department of Defense Nuclear Test Personnel Review (NTPR) Program. The objective is to facilitate studies of the low levels of radiation received by some individuals during the atmospheric nuclear test program by making as much information as possible available to all interested parties.

The material which has been deleted is all currently classified as Restricted Data or Formerly Restricted Data under the provision of the Atomic Energy Act of 1954, (as amended) or is National Security Information.

This report has been reproduced directly from available copies of the original material. The locations from which material has been deleted is generally obvious by the spacings and "holes" in the text. Thus the context of the material deleted identified to assist the reader in the determination of whether the deleted information is germane to his study.

It is the belief of the individuals who have participated in preparing this report by deleting the classified material and of the Defense Nuclear Agency that the report accurately portrays the contents of the original and that the deleted material is of little or no significance to studies into the amounts or types of radiation received by any individuals during the atmospheric nuclear test program.

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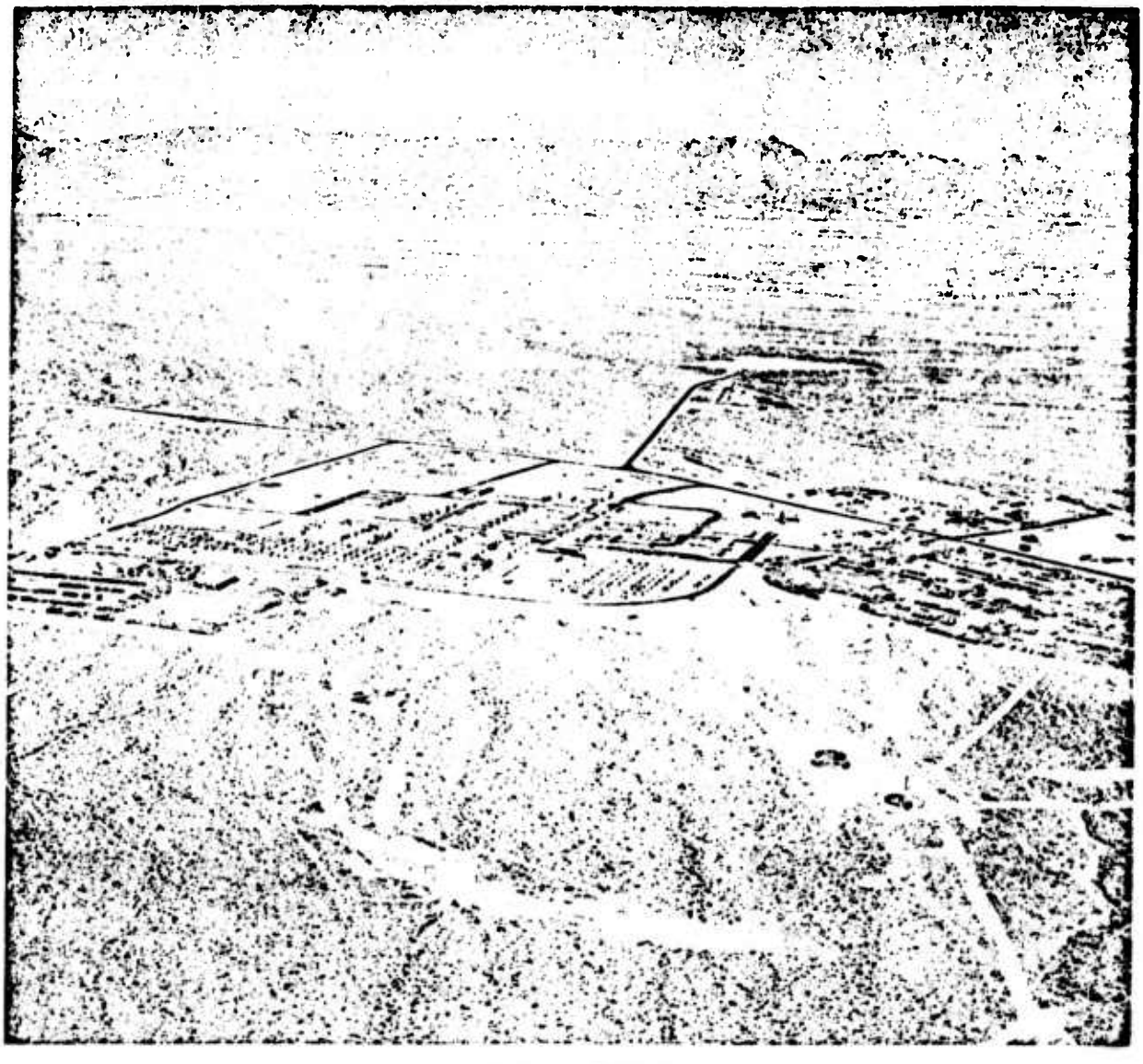


Mercury, Nevada

CONTENTS

Chapter 1
GENERAL SUMMARY

1.1 INTRODUCTION

This report presents a summary of the military participation in Operation Plumbbob, conducted at the Nevada Test Site (NTS) during the period 15 April 1957 through 7 October 1957. During this period, as on Operation Teapot, a Joint Atomic Energy Commission (AEC)-Department of Defense (DOD) Test Organization was operational with James E. Reeves, Test Division, AEC Albuquerque Operations Office, serving as the Test Manager and H. E. Parsons, Col., USAF, Deputy Chief of Staff, Weapons Effects Tests, Field Command, Armed Forces Special Weapons Project, acting as deputy for Military Operations.

This summary does not report the details of technical findings of the military effects experiments. Preliminary reports have been distributed separately and final reports are in the process of preparation and completion. Activities associated with preparation for this operation are recorded in Field Command AFSWP history.

1.2 MISSIONS

The missions of the military representation within the test organization were (1) to conduct a series of military effects experiments, (2) to coordinate a series of operational training projects, (3) to assist the AEC in the conduct of the operation, and (4) to coordinate military activities not falling within the scope and responsibility of the test organization. The missions and responsibility of Field Command, Armed Forces Special Weapons Project (AFSWP), in Operation Plumbbob were outlined by the Chief, AFSWP, to the Commander, Field Command, AFSWP, in letters subject: "Implementation of the DOD Weapons Effects Test Program, Operation Pilgrim" (Plumbbob), dated 13 September 1956 (Figure 1.1) and "DOD Weapons Effects Program, Operation Pilgrim" (Plumbbob), (Figure 1.2).

1.3 DETONATION SCHEDULE

Twenty-four nuclear experimental devices were detonated, the first on 28 May 1957 and the last on 7 October 1957. Nine were detonated from towers, thirteen detonated on balloons, one underground, and one fired from an aircraft. The shot locations are shown in Figure 1.3. Yields, dates, times, and other pertinent shot data are given in the technical summary, ITR-1445, or WT-1445.

1.4 ORGANIZATION

During February 1953, a memorandum of agreement summarizing the principles of DOD participation in the NTS operation was signed by the Commanding General, Field Command, AFSWP, and by the Manager, Santa Fe Operations Office (Albuquerque Operations Office) (Figure 1.4). In

SWPWT/979 13 Sep 1956

SUBJECT: Implementation of the DOD Weapons Effects Test Program, Operation PILGRIM (U)

TO: Commander
Field Command
Armed Forces Special Weapons Project
P.O. Box 5100
Albuquerque, New Mexico

1. Reference is made to:

a. Secret letter, file SWPCG, Chief, AFSWP, dated 4 August 1952, subject: "Augmentation of Responsibilities."

b. Memorandum for Chief, AFSWP, file RD-CAE 246/6, Assistant Secretary of Defense, Research & Development, dated 22 August 1956, subject: "Program and Funding for Operation PILGRIM, Spring, 1957," copy of which is attached hereto as Inclosure 1.

2. Approval by the Joint Chiefs of Staff has been requested for the following:

a. Military participation in Operation PILGRIM in conjunction with Atomic Energy Commission developmental tests to the maximum extent feasible.

b. The inclusion in Operation PILGRIM of a military effects shot of approximately 40 KT to be detonated at Frenchman Flat at the minimum practicable height from a tower or balloon.

c. Resolution by the Chief, AFSWP, of the necessary details for the test implementation with the appropriate agencies of the AEC.

d. Extension of an invitation to the FCDA to participate, at its own expense, in the DOD Weapons Effects Test Program to the maximum extent compatible with DOD requirements.

Favorable action on this request is expected in the near future.

3. The Chief, AFSWP, has:

a. Formulated the Operation PILGRIM Weapons Effects Program, copies of which will be distributed to your headquarters and to the Services during the week of 17 September 1956.

b. Prepared a supplemental program for presentation to the Coordinating Committee on Atomic Energy on 17 September 1956. (Additional funds will be requested for implementation thereof).

c. Requested the Services to furnish detailed requirements for Operational, Training, and Troop Observer participation in Operation PILGRIM.

4. The general military security and public information aspects of the operation will be conducted in accordance with current Service and AFSWP directives. This headquarters will furnish policy guidance on these subjects as appropriate or as requested.

5. By reference 1.b., the Assistant Secretary of Defense (Research & Development) approved the expenditure, for Operation PILGRIM, of $6,809,200* R&D funds; of this amount, $6,724,700 are R&L Army funds allocated to the Chief, AFSWP, and $84,500* will be supplied by the Services (USAF - $50,000; Army - $25,000; USN - $9,500). As of this date, advanced funding has been provided in the amount of $370,000 R&D to participating agencies (See Incl 2). The sum of $450,000 is to be furnished from FY 58 funds for PILGRIM post-operational phase costs. The Chief, AFSWP, has available $1,323,000 M&O Army FY 57 funds for extra-military expenses of Operation PILGRIM. The balance of these funds, $5,904,700 R&D and $1,323,000 M&O, is being transmitted to you by separate communication. (As a matter of information, an additional $200,000 M&O Army FY 58 funds are included in the AFSWP budget (not yet approved) for extra military expenses associated with the post-operational phase of Operation PILGRIM).

6. Pursuant to the provisions of the letter, reference 1.a., it is requested that the Commander, Field Command, AFSWP:

a. Execute the military effects test phases of Operation PILGRIM as a joint AEC-DOD endeavor.

b. Coordinate military assistance and participation in support of the AEC in the conduct of Operation PILGRIM.

c. Coordinate Operational, Training and Troop Observer participation in Operation PILGRIM.

d. Coordinate FCDA participation in the Military Effects Test Program.

7. Direct communication is authorized with the activities, agencies and offices involved in the technical and military aspects of the program.

s/t/ A.R. LUEDECKE
Major General, USAF
Chief, AFSWP

2 Incls:
1. ASD(R&D) Memo, Program and Funding for Opn PILGRIM, Spring 1957, dtd 22 Aug 56
2. NOT INCLUDED

* As amended by Confidential letter, file SWPWT/979, Chief, AFSWP, dated 15 January 1957, subject: "Amendment of letter of Implementation, Operation PILGRIM (U)".

Figure 1.1 Letter: Implementation of the DOD Weapons Effects Test Program, Operation Pilgrim (Plumbbob).

SWPWT/979 20 SEP 1956

SUBJECT: DOD Weapons Effects Program, Operation PILGRIM (C)

TO: SEE DISTRIBUTION

1. As announced in a Secret memorandum for the Chief, AFSWP, dated 18 January 1952, subject: "Atomic Weapons Testing", the Joint Chiefs of Staff have approved the following general policy for the military participation in field tests of atomic devices and weapons:

"a. For tests involving nuclear detonations and conducted within the continental United States, the Chief, Armed Forces Special Weapons Project (AFSWP) will:

"1. Exercise technical direction of weapons effects tests of primary concern to the Armed Forces and the weapons effects phases of development or other tests of atomic weapons.

"2. Coordinate military participation and assistance in support of the Atomic Energy Commission in the conduct of tests of atomic weapons.

"b. Individuals provided by the Services to assist in the conduct of such tests normally will be attached to the AFSWP for the preparatory, operational and roll-up phases. Military organizations required for preparatory, operation and roll-up tasks will remain under the command of their appropriate services and will perform their assigned tasks on a mission basis pursuant to requests from the Chief, AFSWP, to the Services concerned."

2. The Chief, AFSWP, to insure the implementation of future atomic tests in the continental United States pursuant to the policies outlined above, augmented the responsibilities of the CG, Field Command, AFSWP, to include the completion of detailed plans, preparation for the conduct of the technical programs and the submission of completed reports upon the conclusion of the field operations by Secret letter, file SWPCG, dated 4 August 1952, subject: "Augmentation of Responsibilities". In the execution of these functions, the Commander, Field Command, AFSWP, will represent the Chief, AFSWP, as the agent of the Department of Defense for coordination with the Atomic Energy Commission, its contractors and any other Government agency participating in the test activities. The Deputy Chief of Staff, Weapons Effects Tests, is charged with the responsibility for the execution of the functions of the Field Command, AFSWP, outlined above. Direct communication relative to matters associated with Operation PILGRIM is authorized between the Deputy Chief of Staff, Weapons Effects Tests, and all participating agencies sponsored by the Department of Defense.

3. The approved military weapons effects tests projects in Programs 1–9 inclusive (except 7, not used) for Operation PILGRIM are outlined in Inclosure 1, "Operation PILGRIM, Weapons Effects Program". This outline specifies the objective, scope, approve cost in R&D funds, and the name of the project officer and agency scheduled to conduct each of the technical military projects included in Operation PILGRIM. The projects may be modified as required by operational necessity if authorized by the Commander, Field Command, AFSWP.

4. With the exception of advance Research and Development funds already released to sponsors or organizations, funds will be obtained from the Commander, Field Command, AFSWP. He is authorized to administer both the advance funds already released by the Chief, AFSWP, and the funds to be released by the Commander, Field Command, AFSWP. The Commander, Field Command, AFSWP, further is authorized to withhold for purposes of control and for on-site project expenses a portion of the R&D funds budgeted for each project, issuing funds from appropriate available sources as the progress of the program and projects indicate. Reports relative to the status, expenditures and obligation of funds will be required by the Commander, Field Command, AFSWP, who will advise project agencies of these requirements. The instructions relative to reports covering funds advanced by the Chief, AFSWP, continue.

5. The Commander, Field Command, AFSWP, will issue instructions relative to project progress and status reports. The preparation, submission and review of the drafts of both the preliminary and final program and project reports and the distribution of the published reports will be under the supervision of the Commander, Field Command, AFSWP.

6. Individual program and project personnel, both civilian and military, associated with the DOD military weapons effects tests programs will report to and be subject to the control and orders of the Commander, Field Command, AFSWP, from the time they report for duty, temporary duty, or detached service with the test organization, and continuing until released therefrom as individuals or in groups. The details as to time and place of reporting will be arranged directly between the Commander, Field Command, AFSWP, and the appropriate personnel agencies. Personnel administration of individuals and units will be in accordance with pertinent Service directives. The technical direction exercised by the Commander, Field Command, AFSWP, over both civilian and mili-

Figure 1.2 Letter: DOD Weapons Effects Program, Operation Pilgrim (Plumbbob).

tary personnel associated with the DOD military weapons effects tests program will commence immediately and terminate upon approval of the final technical report.

7. The Commander, Field Command, AFSWP, will exercise operational control over all equipment and material in the possession of the DOD projects or individuals on duty at the Nevada Test Site.

8. The Deputy Chief of Staff, Weapons Effects Tests, Field Command, AFSWP, will exercise control over all visits of DOD participating personnel, both civilians and military. The entry of such personnel into the Nevada Test Site will not be permitted unless the proposed visit has been coordinated previously with the Deputy Chief of Staff, Weapons Effects Tests.

9. Administrative and command relationships between units or individuals and the joint AEC-DOD Test Organization will be as directed by Commander, Field Command, AFSWP, within the provisions of the JCS memorandum of 18 January 1952.

10. The handling of public relations and security matters associated with Operation PILGRIM involving DOD participating personnel (civilian, DOD contractors, or military) will be in accordance with current Service and AFSWP directives.

11. The control and supervision of joint AEC-DOD projects will be in accordance with agreements between the Commander, Field Command, AFSWP, and the AEC Test Manager.

12. The policies outlined in this letter have the concurrence of the Military Services.

s/t/ A.R. LUEDECKE
Major General, USAF
Chief, AFSWP

1 Incl:
NOT INCLUDED

Figure 1.2 Continued.

keeping with this agreement and based on experience and precedents established in earlier operations, AEC and DOD activities were merged into an integrated functional organization. An outline organization chart for Operation Plumbbob as agreed to by Commander, Field Command, AFSWP, and Manager, Albuquerque Operations Office, is shown in Figure 1.5.

1.5 DEPARTMENT OF DEFENSE TEST GROUP

The Department of Defense Test Group was activated as a unit of the Test Director's organization. Its mission was to exercise technical direction of all military weapons effects tests conducted in conjunction with the Operation Plumbbob detonations. Experiments were conducted in connection with a number of the events with primary interest directed toward Shot Priscilla in Frenchman Flat. In general, the basic objectives of the military effects program were met and much useful information obtained. The reader is referred to the individual technical reports for detailed information and results (see ITR-1445 for the list of project summaries). A brief summary of the Test Group activities is presented in Chapter 2 of this report.

1.6 MILITARY ASSISTANCE TO THE AEC

In keeping with the directive of the Chiefs of the Services to the Chief, AFSWP (Figure 1.6), the principal military assistance to the AEC was provided by the Services on a mission basis at the request of AFSWP.

The Air Force Special Weapons Center (AFSWC) provided aircraft required for bomb launch, cloud sampling, cloud tracking, weather reconnaissance, courier, sample return, security patrols and miscellaneous air support. AFSWC, as requested by AFSWP, also assumed operational control of all aircraft operating over NTS. These included aircraft of the Army, Navy, Marine Corps, Strategic Air Command, and the Air Defense Command.

The Air Weather Service (4th Weather Group) established and operated weather forecasting and observing stations at and in the vicinity of the NTS on a 24-hour basis and presented weather briefings as required by the Test Manager.

Nellis AFB provided parking space and accommodations for aircrews for a limited number of special air missions, official observers and project aircraft, and use of the base railhead and miscellaneous support as required.

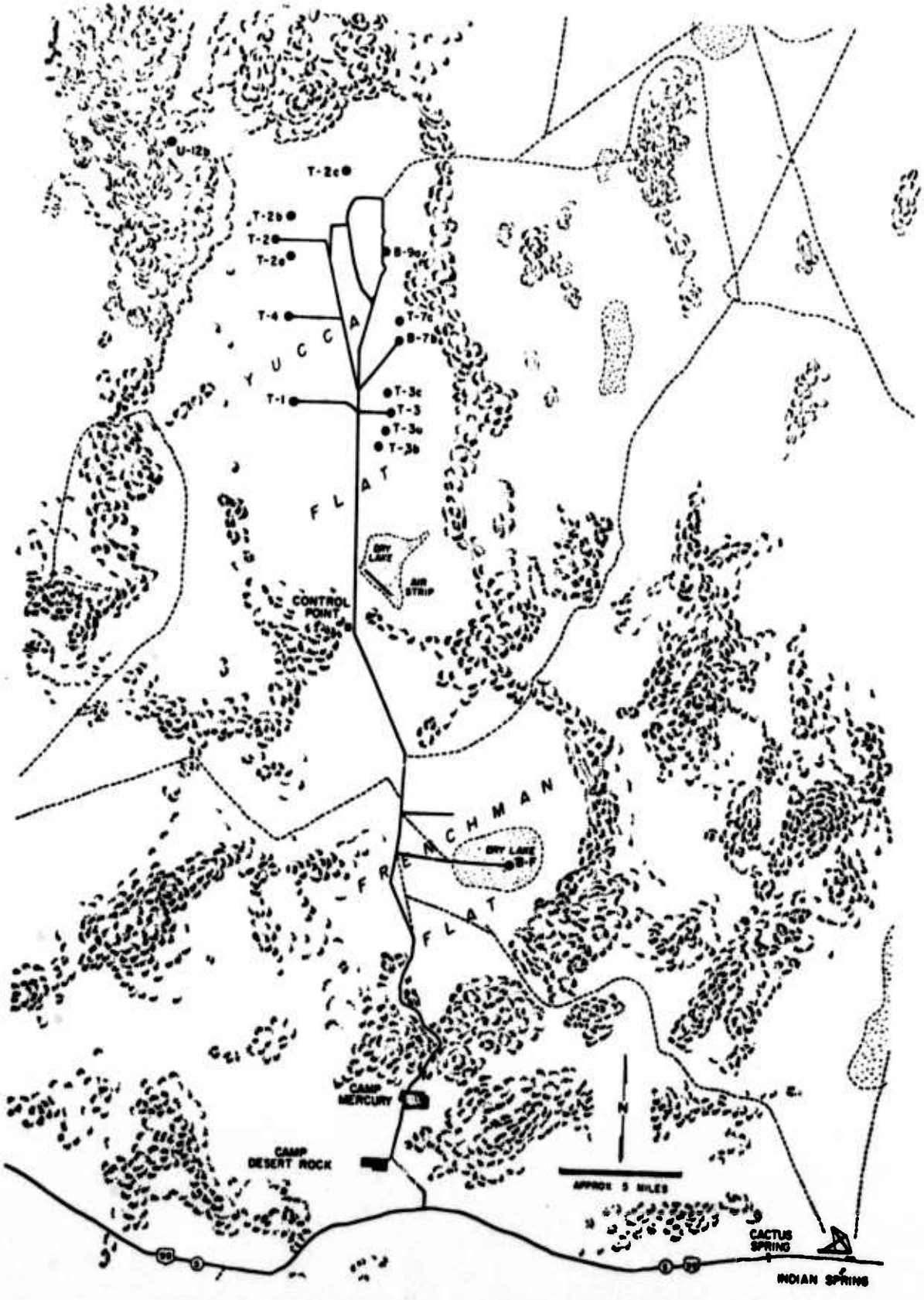


Figure 1.3 Plumbbob shot areas.

MEMORANDUM OF AGREEMENT
NEVADA PROVING GROUND OPERATION

16 Feb 1953

1. PURPOSE:

The purpose of this agreement is to summarize the principles governing activities of the Department of Defense (DOD) in connection with operations at the Nevada Proving Ground.

2. GENERAL:

a. The Nevada Proving Ground is a facility of the Atomic Energy Commission (AEC) operated under the jurisdiction of the Manager, Santa Fe Operations (SFO) for the conduct of atomic weapons tests and associated experiments and demonstrations as required by the AEC, the DOD, and other government agencies.

b. During non-operational periods the Proving Ground is under the immediate supervision of the Field Manager, Las Vegas Field Office (LVFO), AEC. During operational periods, the Manager, SFO, or some other designated AEC officer, in the capacity of Test Manager, assumes operational responsibility for all test activities within the Proving Ground. In addition to participating in and conducting experiments, the DOD assists and provides support to the AEC in the conduct of test operations.

3. SPECIFIC:

a. During non-operational periods the Commanding General, Field Command, will maintain at Mercury a detachment to assist the Manager, LVFO in facilitating visits by DOD personnel, to maintain DOD property, and to provide to the AEC radsafe and such other services as are agreed.

b. During non-operational periods the Commanding General, Field Command (Director of Weapons Effects Tests) is responsible for the technical supervision of preparations for DOD-sponsored experiments, for coordinating other military participation, and for arranging for military assistance to the AEC. In fulfilling these responsibilities the Directorate of Weapons Effects Tests will coordinate actions with the Office of Test Operations, SFO, Los Alamos Scientific Laboratory and other appropriate agencies.

c. For the execution of DOD-sponsored test operations, the Test Manager will report to the Chief, AFSWP through the Commanding General, Field Command. A mutually satisfactory organization will be activated during operational phases in which DOD personnel are functionally integrated to the maximum practicable extent. Military units engaged in test activities (exclusive of Desert Rock participation) will perform tasks on an agreed mission basis pursuant to the request of the Commanding General, Field Command. Once the scope and principles of Desert Rock exercises have been agreed between the DOD and the AEC, the Exercise Director will be permitted maximum latitude in the conduct of his operations consistent with other test requirements.

d. The Commanding General, Field Command, will direct a senior officer, normally the Director of Weapons Effects Tests, to report to the Test Manager and serve as the Test Manager's Deputy for Military Operations. Matters involving military administration, accountability of DOD-owned equipment and supplies, and the expenditures of DOD funds, except as otherwise specified in the current AEC-DOD fiscal agreement, will be referred to the Commanding General, Field Command or to other DOD agencies by the Deputy for Military Operations without reference to the Test Manager unless matters of principle pertinent to the AEC are involved.

4. CHANGES:

a. Nothing in this agreement shall be construed to alter existing agreements covering security and fiscal matters. Additional agreements covering special subjects or formal concurrence in plans and procedures will augment this agreement as required.

b. The terms and conditions of this agreement may be changed at any time by mutual agreement between the Manager, SFO and the Commanding General, Field Command.

APPROVED:

/t/ Carroll L. Tyler
Manager, Santa Fe Operations
U.S. Atomic Energy Commission

/t/ Leland S. Stranathan,
Brig Gen, USAF
Commanding General
Field Command, AFSWP

Figure 1.4 Letter: Memorandum of Agreement, Nevada Test Site Operation.

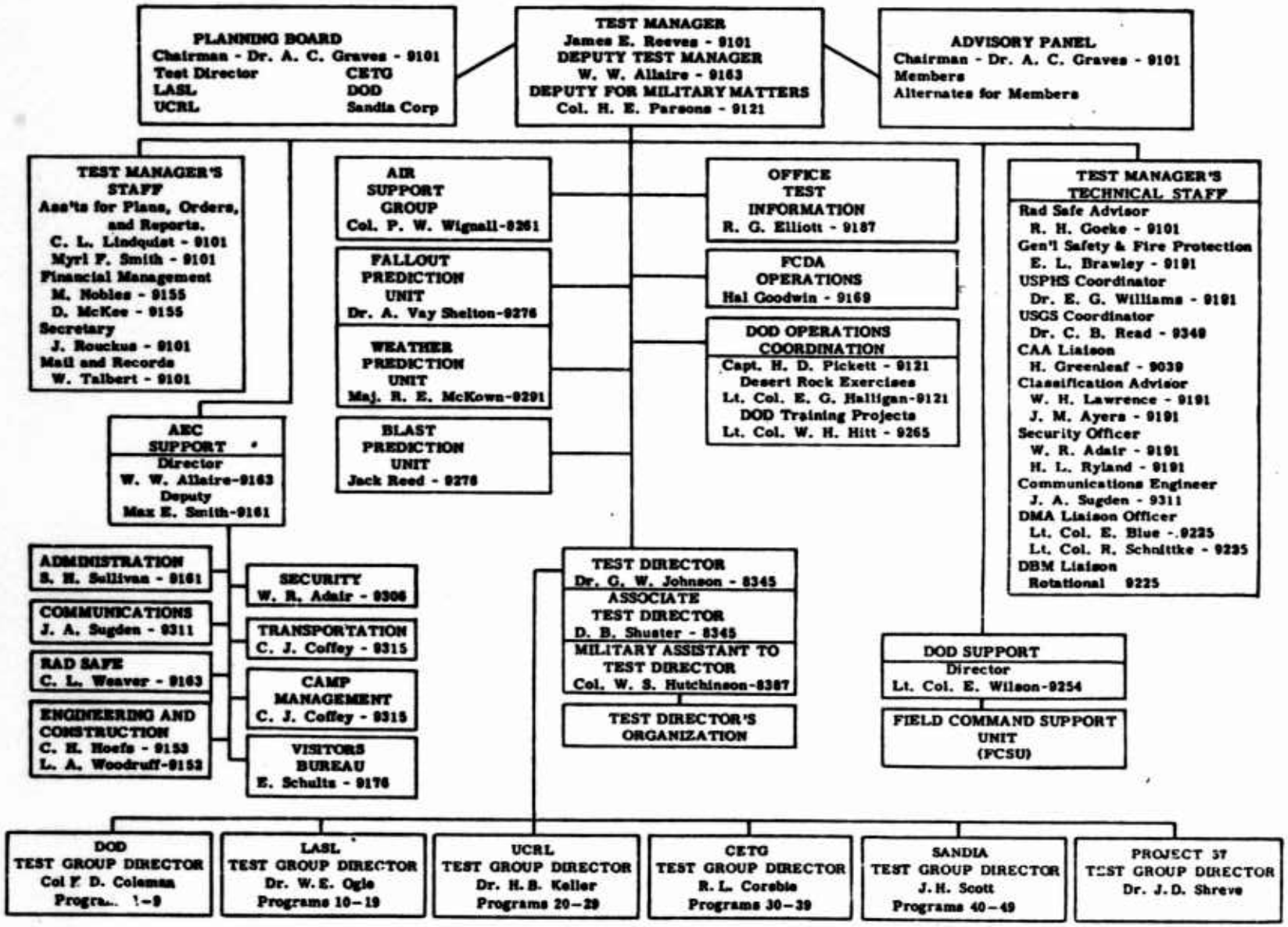


Figure 1.5 Joint test organization.

18 January 1952

MEMORANDUM FOR THE CHIEF, ARMED FORCES SPECIAL WEAPONS PROJECT

Subject: Atomic Weapons Testing

1. The Joint Chiefs of Staff have approved the following general policy for future military participation in field tests of atomic devices and weapons:

a. For tests involving nuclear detonations and conducted within the continental United States, the Chief, Armed Forces Special Weapons Project (AFSWP) will:

1. Exercise technical direction of weapons effects tests of primary concern to the Armed Forces and the weapons effects phases of development or other tests of atomic weapons.

2. Coordinate military participation and assistance in support of the Atomic Energy Commission in the conduct of tests of atomic weapons.

b. Individuals provided by the Services to assist in the conduct of such tests will normally be attached to the AFSWP for the preparatory, operational and roll-up phases. Military organizations required for preparatory, operational and roll-up tasks will remain under the command of their appropriate services and will perform their assigned tasks on a mission basis pursuant to requests from the Chief, AFSWP to the Services concerned.

2. In the performance of these functions the Chief, AFSWP will:

a. Continue to have responsibility for preliminary plans and budgets for military phases of atomic tests.

b. Make such arrangements, through established channels, as may be necessary to coordinate plans and operations with the Atomic Energy Commission.

c. Submit recommendations to the Chiefs of the Services as to assistance required.

3. The Joint Chiefs of Staff have approved military participation in Operation SNAPPER. The test program and expenditure of funds which you submitted to the Chiefs of the Services by letter, dated 8 November 1951, have been approved, subject to such adjustments as may be made by the Research and Development Board. The Joint Chiefs of Staff have also recommended that the Services assign appropriate priorities to the projects under their jurisdiction to facilitate the procurement of equipment, personnel, and supplies for the conduct of SNAPPER.

4. The responsibilities outlined in paragraph 1 above, apply to the special test to determine the air blast effects of atomic weapons, as well as to Operation SNAPPER.

/s/ J. Lawton Collins
J. LAWTON COLLINS
Chief of Staff, U. S. Army

/s/ W. M. Fechteler
W. M. FECHTELER
Chief of Naval Operations

/s/ Hoyt S. Vandenberg
HOYT S. VANDENBERG
Chief of Staff, U. S. Air Force

Figure 1.6 Letter: Atomic weapons testing.

A detachment from a heavy maintenance company from Fort Ord, California, provided vehicle maintenance of the DOD vehicles during the final period.

1.7 DESERT ROCK EXERCISE

Exercise Desert Rock VII and VIII was designed to provide orientation and indoctrination of Service personnel, as well as the conduct of certain troop tests. For a more detailed discussion of this program see Chapter 4 of this report.

1.8 OPERATIONAL TRAINING PROJECTS

A series of Operational Training (O&T) Projects to test service tactics and operational equipment and to provide training and indoctrination of military personnel was conducted during the test. In addition to the O&T projects under the cognizance of the Desert Rock Exercise Director, the Navy, Marine Corps, SAC, ADC[

1.9 GENERAL COMMENTS

The operational problems and areas of conflict between the numerous participating agencies were resolved with a minimum of disruptions for all concerned. The excellent spirit of cooperation and improved organizational setup were major contributing factors. The succeeding chapters of this report discuss in more detail the military participation on Operation Plumbbob.

Chapter 2
DOD TEST GROUP

2.1 INTRODUCTION

Figure 2.1 shows the organization of the office of the Deputy Chief of Staff, Weapons Effects Tests, in Field Command, AFSWP. It was through this staff office that the Commander, Field Command, executed the preoperational phase of Operation Plumbbob. On 15 April 1957, when the organization moved to the Nevada Test Site and became operational, the Test Division from this staff office was integrated, with minor changes, into the Nevada Test Organization as the DOD Test Group. Figure 2.2 shows the organization of this group.

A brief summary of the weapons-effects test programs is given in this chapter. For more detailed information on the technical results of these programs the reader is referred to the report of the Director, DOD Test Group, Operation Plumbbob (ITR–1445).

2.2 OBJECTIVES

There were six major areas of investigation in carrying out the objectives of the weapons-effects test program during Operation Plumbbob. These were:

1. Loading and response of structures and blast-and-shock phenomena in the higher pressure regions above 50 psi.
2. The influence of rough terrain on blast-and-shock phenomena and on damage effects.
3. Neutron-induced activity in soils.
4. Delivery criteria (nuclear and blast inputs) for the F-89D aircraft in delivering an MB-1 rocket.
5. Effects of nuclear weapons on a large biological specimen (swine).
6. Effects of nuclear weapons on military equipment.

2.3 PARTICIPATION

Table 2.1 lists the shots on which each project actually participated. There were 43 projects in the weapons-effects test program and they participated in 24 shots during Operation Plumbbob. Participation was not always as planned because of such factors as instrumentation difficulties and changes in yield or firing schedule.

2.4 WEAPONS-EFFECTS TEST PROGRAMS

2.4.1 Program 1 — Blast and Shock. Program 1 was primarily concerned with three general areas of investigation. First, requirements for hard protective construction resulted in an extensive study of underground effects in the high incident overpressure (above 50 psi) region. Second, it was necessary to document the characteristics of the air-blast wave in the region above 50 psi, both to extend present prediction capability, and to correlate this with the underground data. The third objective of Program 1 was to investigate the effect of rough and hilly terrain on the blast wave and on damage to military equipment. In addition, there were projects investigating air-blast wave forms, shock spectra, response of model petroleum storage tanks, ground-level pressures from Shot John (high altitude and missile), and testing of an instrumentation system for Operation Hardtack.

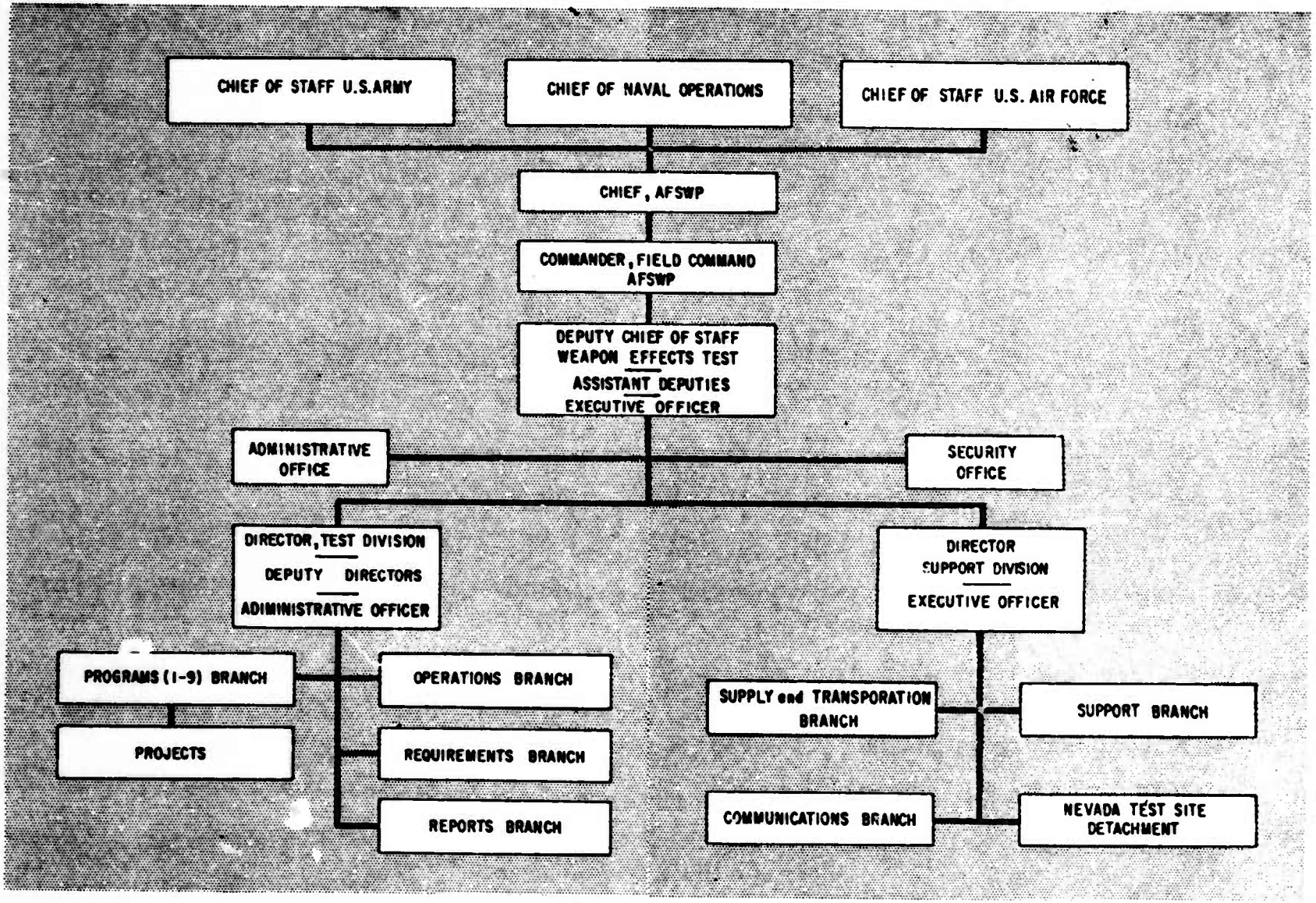


Figure 2.1 Organization of the Office of the Deputy Chief of Staff, Weapons Effects Tests, and its relation to the Chiefs of Staff.

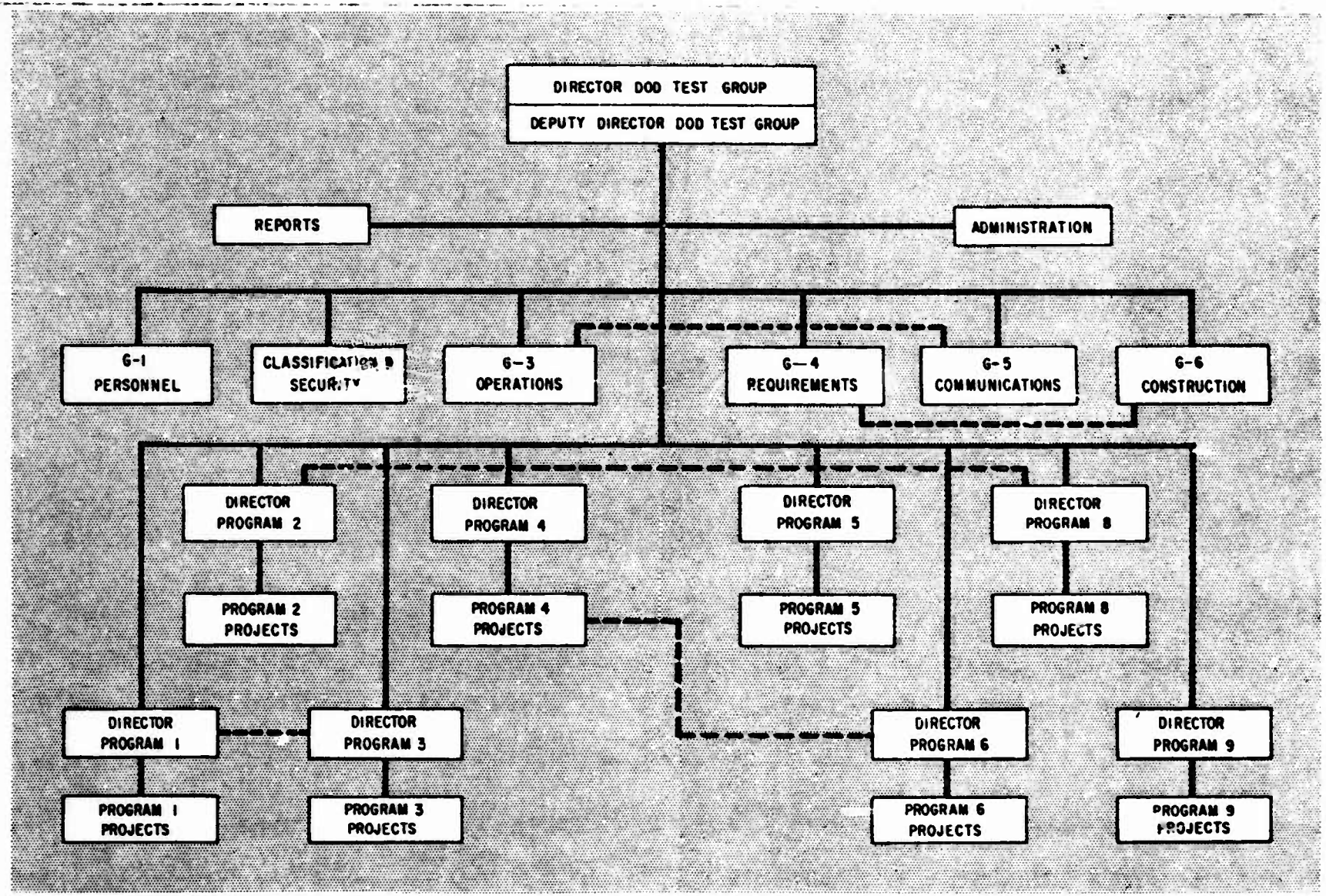
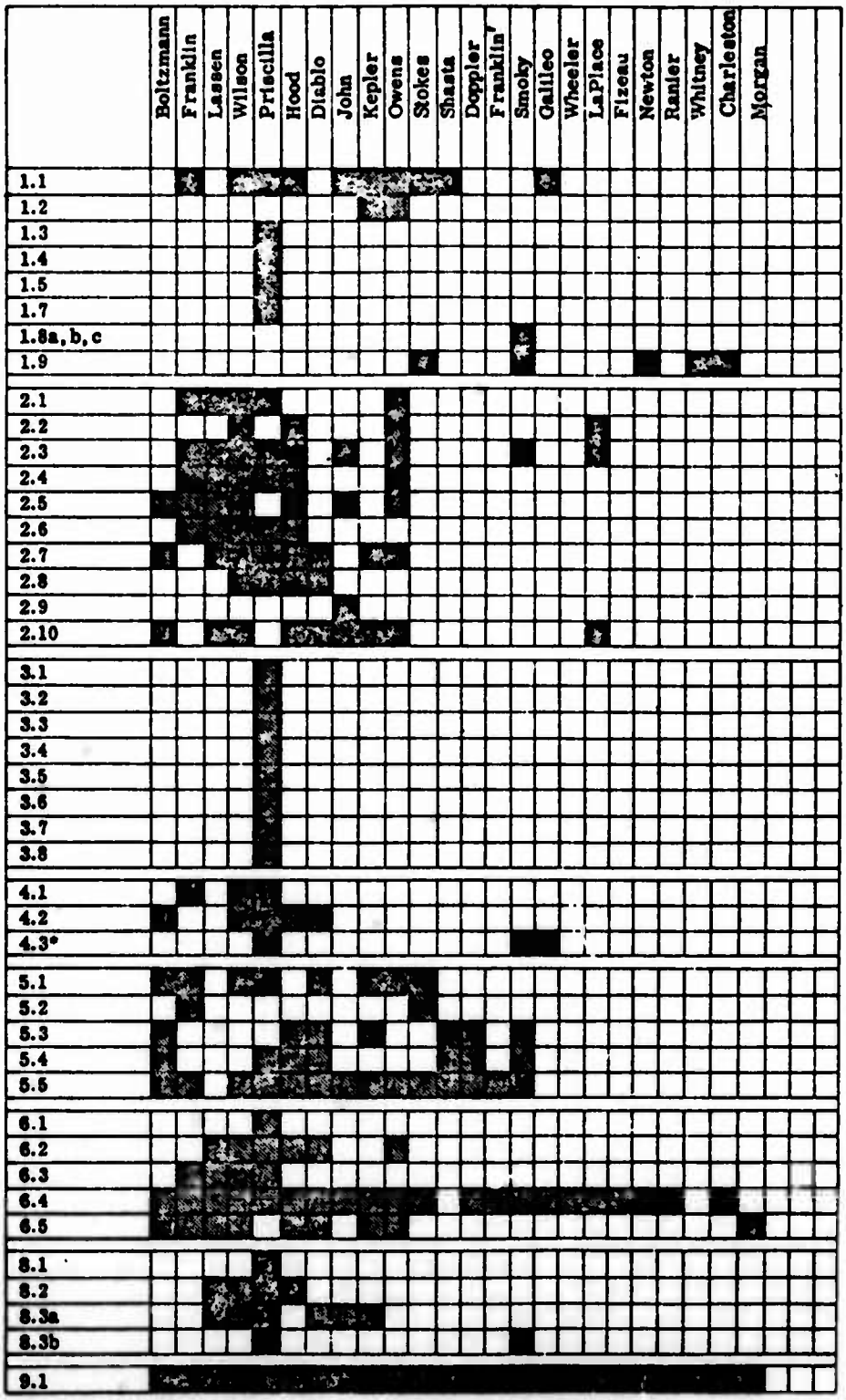


Figure 2.2 DOD Test Group, Nevada Test Organization. Dotted lines indicate alternates.

TABLE 2.1 PROJECT PARTICIPATION



* Partially funded and coordinated with DOD; administrated by CETG.

■ Indicates participation.

The underground and high pressure air-blast studies were concentrated on Shot Priscilla. Underground instrumentation was installed at depths down to 200 feet and ranges from ground zero out to about 1,500 feet. Free-field air-blast instrumentation was stationed at ranges from a few hundred to several thousand feet, covering the pressure range of 1,000 to 5 psi.

Terrain study participation was limited to Shot Smoky, which was located within 1,500 feet of a series of hills and ridges. Five instrumentation lines were established, each covering a different type of terrain. Jeeps were used to investigate protection given by special types of terrain features.

All three major objectives were fulfilled. The underground studies produced documentation of acceleration, velocity, displacement, and stress in the regions of interest. Measurements from the free-field air-blast instrumentation permitted construction of a composite overpressure curve from 1,000 to 5 psi. Dynamic pressures were made at ranges from 500 to 1,000 feet, the highest being about 500 psi.

Results of the terrain study were generally successful. The vehicle damage study indicated that a large degree of protection was given by obstacles having a steep downslope adjacent to the vehicle on the side toward ground zero.

2.4.2 Program 2—Nuclear Measurements and Effects. The Program 2 effort was comprised of ten projects which included studies of neutron-induced soil activity, initial gamma and neutron radiation, attenuation of electromagnetic waves by the ionized sphere produced by atomic detonations, nuclear-radiation shielding, and instrumentation.

The neutron-induced soil activity study was an integrated program performed on Shot Owens. Three types of typical American soils as well as a variety of constituent soil elements were exposed and the resultant induced activity studied. Neutron flux and spectra versus distance and depth in soil, and induced gamma activity with distance and time were measured to assist in interpretation of the results obtained.

Neutron flux, spectra, and dose as a function of distance were measured on a number of devices of potential tactical interest. Gamma dose rate as a function of time and distance and gamma total dose were also determined for devices of varying yields. Although both neutron and gamma measurements were made principally on the surface, measurements were also made as a function of altitude above the ground to evaluate the effect of the air-ground interface on such measurements. The gamma and neutron dose sustained by aircraft crews involved in the delivery of an air-to-air missile was also determined.

Instrumentation proposed for use in making nuclear radiation measurements at very high altitudes during Operation Hardtack was proof tested and the problem of telemetering this data from these altitudes studied. A general study of the phenomena of attenuation of electromagnetic waves by bomb-generated ionization was also performed.

The nuclear-radiation-shielding characteristics of Program 3 structures, foxholes, machine-gun emplacements, personnel shelters, M-48 tanks, and ONTOS vehicles were studied.

The evaluation of radiation instrumentation included the testing of a newly developed tactical neutron dosimeter, the IM-123 beta-gamma survey meter, shielded DT-60 and IM-107 personnel dosimeters, and the AN/PDR-43 and AN/PDR-44 survey meters.

2.4.3 Program 3—Effects on Structures and Equipment. Program 3 consisted of eight projects and had a primary objective of obtaining loading and response data on various types of above- and below-ground structures in the overpressure region above 50 psi. The second major objective was to proof test various underground structures on a go-no-go basis to determine their ability to provide Class I (100 psi) and Class II (50 psi) protection as prescribed in the current DOD protective construction policy. The third major objective was to obtain any loading and response information from existing structures constructed for past tests in the Frenchman Flat area.

As a related objective, these same structures were utilized by projects of Program 2 for studies of gamma and neutron radiation shielding within the structures. Two DOD agencies,

Ballistic Research Laboratories (BRL), and Armour Research Foundation (ARF), of Program 3 provided all structures blast loading and response instrumentation for the DOD as well as Civil Effects Test Group (CETG), Federal Civil Defense Administration (FCDA), structures projects. Also, the DOD dome and arch Project 3.6 and related FCDA dome Project 30.1 were coordinated and mutually supported.

Participation of Program 3 was concentrated on Shot Priscilla. Twenty-five newly constructed, major, full-scale structures, extensively instrumented, were tested. In addition, several more minor full-scale structures and several more structures existing from previous operations were also tested.

The eight projects participating in Program 3 were in three general groups:

1. Loading and response of underground structures in the high-pressure region.
2. Loading and response of above-ground structures in the high-pressure region.
3. Loading and response of various existing structures primarily in the low- and moderate-pressure regions.

The projects were successful in achieving the objectives of the program and made a significant contribution to the blast and shock structural loading and response information available for the higher pressure regions.

The numerous underground structures tested sustained less damage than predicted. Thus, it was concluded that the design assumptions upon which such underground structures had been planned and analyzed were more conservative than necessary for the size spans tested. It was also shown, confirming theory, that underground arch-type shelters were structurally a most efficient type to withstand high overpressures and that this type could be readily constructed to withstand overpressures up to at least 200 psi. It was further concluded that DOD Class I and Class II personnel protection could be readily obtained from a 36.6 kt device by use of any of the following three types and sizes of underground structures tested: (1) the underground, commercially available, 8-foot diameter, corrugated steel or concrete conduits; (2) the underground, 16-foot span reinforced-concrete arch structures; and (3) the partially underground, 25-foot span, rib-strengthened, modified-standard-stock, corrugated-steel-arch structures. For these structures, the results indicated that a minimum of about 5 feet of earth cover was required to provide sufficient radiation shielding protection.

The aboveground dome and arch structures tested sustained somewhat greater damage than expected. For the domes this was probably because the reflected pressure loadings on the dome curved surfaces were in excess of predictions; for the arches the reflected pressure loadings were slightly less than predicted. Considerable analysis of the tests on domes and arches generally confirmed theory and model shock-tube data which indicated that for aboveground protective structures the curved-surface dome and arch type structures were structurally the most efficient type for use in higher overpressure regions and that such structures could be constructed to withstand overpressures up to at least 70 psi.

2.4.4 Program 4—Biomedical Effects. This program was devoted to evaluating the effects of a nuclear device on a large biological specimen, evaluating the eye protection afforded by an electromechanical shutter and evaluating the casualty effect of missile translation by the nuclear device.

The pig was determined to be a suitable animal for the project and some 1,200 swine were systematically exposed to the bomb effects. Thermal, pressure, and radiation measurement as required were made in support of the project. After exposure and as soon as the radiation conditions permitted, the animals were recovered and returned to the animal hospital area. Surgical and medical treatment were administered and documentary records kept on each animal. As a result of random exposure of the animals over a wide range of distance from ground zero, including some pigs in field fortifications, all permutations and combinations of thermal, radiation, and mechanical injuries were observed.

For the evaluation of electromechanical shutters there was one air station (C-47 aircraft) and one ground station (trailer) where human volunteers viewed the flash through protective shutters. Rabbits were exposed as controls at the same location. The C-47 staged out of Nellis Air Force Base and the volunteers, after exposure, were returned to Nellis AFB hospital for complete eye examination. The electromechanical shutters closed in approximately ½ msec and, under conditions of the test, gave complete protection.

The project for the evaluation of casualty effect of missiles was administered by CETG and is covered in the Project 33.2 report.

2.4.5 Program 5—Effects on Aircraft. Program 5 participation included an HSS-1 helicopter and a ZSG-3 airship, both included to attempt to define the capabilities of these aircraft in delivering antisubmarine warfare (ASW) weapons. Two Navy airplanes, an FJ-4 and an A4D-1, participated with interest directed toward the delivery of air-to-ground weapons. One Air Force F-89 was used to study the problem of defining capabilities for delivering an air-to-air weapon.

Preliminary field analysis of data indicated that the objectives of the various aircraft studies were accomplished except for the airship project which required further detailed analysis before adequate conclusions could be drawn. It was indicated that the crushing effects of overpressure would be limiting for the HSS-1 helicopter. The delivery capability for nuclear antisubmarine weapons will not be fully defined, however, until sufficient information is available to accurately predict the free-air effects for underwater detonations. Under the test conditions experienced by the ZSG-3 airship, the car structure and suspension system appeared to be satisfactory strength-wise, but tail assembly movable surface stops may have received damage from shock-wave forces on the control surfaces. For the free-flight conditions, the envelope and ballonet response to shock inputs appeared to be the critical element in the airship system. For the FJ-4, good correlation was obtained between measured and analytical structural data for low-yield devices but methods for predicting thermal inputs were not satisfactory. Sufficient data were obtained to confirm the delivery capability of the A4D-1 for low-yield devices. The dynamic response of the F-89 to blast produced higher wing loads than predicted analytically in the capability study. The significant F-89 structural loads resulted only from the gust associated with the shock wave; thermal and diffraction effects were so small as to be unimportant. Incremental dynamic loads were not affected by the magnitude of maneuvering loads existing on the structure of the F-89 at shock arrival.

2.4.6 Program 6—Service Equipment and Material. Program 6 consisted of five projects:

1. A mine-field clearance study conducted by the Engineer Research and Development Laboratories.
2. A project to measure the magnetic field of a nuclear detonation, conducted by the Diamond Ordnance Fuze Laboratory.
3. An investigation of the effects of a nuclear cloud on the propagation of radio and radar signals, conducted by the Naval Air Development Center.
4. A project involving the long-range detection and location of nuclear detonations, conducted by the Air Force Cambridge Research Center.
5. A study of the radiation effects on guided missile components, materials, and systems, conducted by the Ordnance Mission, White Sands Proving Ground.

In the mine clearance study, the principal objective was to investigate the behavior of pressure actuated antitank mines under blast loading from a nuclear detonation.

Preliminary examination of the data obtained indicated: (1) that the method used to predict the probability of mine actuation was reasonably accurate; (2) that sympathetic actuation extended mine clearance under nuclear blast effects; (3) that mine response under nuclear blast effects increased with burial depth to between 6 and 9 inches, and then decreased at greater depths; (4) that as the shape of the pressure pulse changed from a relatively slow rising front in the pre-

cursor region to a fast rising front beyond that region, mine response tended to increase; and (5) that the three influence-type fuzes tested appeared to be relatively invulnerable to a nuclear detonation.

In the project to measure electromagnetic effects, the principal objective was to measure in the near field region the magnetic component of the electromagnetic pulse emitted from a nuclear detonation.

Preliminary observations indicated: (1) that the largest component of the magnetic field lay in the azimuthal direction; (2) that strong components, which did not resemble the azimuthal component and possibly had a different origin, existed in the radial and vertical directions; (3) that the signal strength varied inversely at least as the square of the distance from the detonation and possibly as the cube; and (4) that the field was reduced to below an order of magnitude of the peak field strength in less than 100 μsec with weaker signals persisting in some cases for several milliseconds.

In the investigation of effects of a nuclear cloud on a propagation of radio and radar signals, the objective was to measure the attenuation of frequencies (in the region from 4 to 9,245 Mc) caused by their propagation through the ionized environment of a nuclear cloud. With the measurements obtained, it was planned to calculate the rate of electron removal within the cloud.

Measurements were made at approximately 4, 20, 160, 960, 3,100, and 9,200 Mc by transmitting these frequencies from an aircraft flying a course which was to direct the energy through the cloud to a set of ground-based receivers. The outputs of the receivers were measured and compared with preshot calibration data to determine attenuation.

No attenuation of any of the test frequencies occurred as a consequence of passage through the clouds.

To fulfill Air Force requirements for an Atomic Strike Recording System, the Air Force Cambridge Research Center (AFCRC) had a project to investigate a system that would indirectly detect and locate atomic strikes on a global basis.

During Operation Plumbbob three nets were operated: one at Albuquerque, New Mexico, 550 miles from the test site; another at Vale, Oregon, at 480 miles; and the third at Rapid City, South Dakota, at 830 miles. Forty lines of position (from a possible 46) were obtained having average errors of 0.5 naut mi with the Albuquerque net, 0.4 naut mi with the Vale net, and 0.8 naut mi with the Rapid City net. These lines of position gave fixes having an average error of 0.8 naut mi. In general, the times of detonation were established with an error of less than 10 msec.

Lightning transient information was collected for approximately 10 hours throughout the test series at times of maximum thunderstorm activity. In general it was found there were no consistent patterns peculiar to the wave forms, field intensities, or pulse durations of these transients that would distinguish them from the electromagnetic pulse of a nuclear detonation.

In the project involving the study of radiation effects on guided missile components, materials, and systems, the principal objective was to ascertain the effects of nuclear radiation on the guidance package of the Nike-Hercules guided missile. Results were quite complex but may be found in the technical summary, ITR-1445.

In the reflectivity investigation, signal returns from the fireball and cloud of several detonations were noted, but as in the attenuation measurements it was not known whether these were caused by ionization or resulted from dust and other particles.

2.4.7 Program 8—Thermal Radiation Measurements and Effects. This program accomplished the following: Investigated the thermal protection of the individual soldier, determined the effects of thermal radiation on a standard reference material, evaluated laboratory methods for determining the protection afforded by uniform systems, and tested some instrumentation systems.

For the protection of the individual soldier in the region of 5 to 25 cal/cm^2, three hot weather uniform ensembles, several shielding materials and a flashburn cream for protection of the

hands and face were tested. It was found that none of the uniforms would withstand the thermal input energies of interest to the Continental Army Command (CONARC) and remain usable. Two of the experimental uniform ensembles, nevertheless, offered some protection to the individual, while the one presently recommended for standardization did not. The primary difference in degree of protection between these was believed to be the result of the fire-retardant treatment given the two new experimental uniforms. The one under consideration for standardization was not so treated and flamed, producing severe and extensive burns, while the burns under the others were less severe and considerably less extensive. The shielding materials gave some protection to both the uniforms and the flesh, as would be expected, where sufficient space between shield and the protected item existed. The flashburn cream appeared to provide fair protection to both levels tested, 15 and 25 cal/cm^2, and only a few small areas of burn were noted.

For the studies of thermal effects on a standard reference material, alpha cellulose papers were used as a reference standard to compare the results obtained in the field with those obtained in the laboratory. The data obtained indicated that laboratory methods for studying ignition of cellulose materials appeared to be adequate regarding radiant exposure, pulse shape, and geometry. Because of blast effects, any definite differences in thermal effects caused by aperture size could not be determined.

Two new types of passive calorimeters were tested, one developed at the University of Rochester and one developed at the Naval Material Laboratory. Both gave good results within the limits tested.

A streak spectrograph system to be used for Operation Hardtack was tested by the U. S. Naval Radiological Defense Laboratory (NRDL) with satisfactory results.

Improved instrumentation of types similar to those used on Operation Redwing for making measurements inside the fireball were tested by the Wright Air Development Center (WADC). In addition, some new instrumentation, consisting of various materials including ceramics, metals, and plastics inserted in spheres and a ballistic shape, was tested to learn something of the effects of thermal and electrical conductivities and ionization potentials on the mechanism of ablation.

2.4.8 Program 9—Support Photography. This program was primarily of a support nature and consisted of a single project which was concerned with:

1. Technical photographic support of the military-effects programs.
2. The documentation of the overall military-effects program and production of an effects motion picture.
3. The documentation of the detonations for release through the Joint Office of Test Information, and for historical purposes.
4. The general photographic support of DOD projects.

For the purposes of technical photographic support, Program 9 provided camera instrumentation on ten shots of the test series as shown in Table 2.2.

For the purposes of documentation of the weapons-effects program and the production of a military-effects motion-picture report, approximately 75,000 feet of color motion-picture film was taken at the test site. This footage was planned and accomplished to cover the significant features of participation of each DOD project. From this footage a military-effects motion picture was produced.

To document the detonations for historical purposes and for release to the press through the Joint Office of Test Information, both color and black-and-white coverage of each detonation was accomplished from an air-borne camera station and a forward-area manned camera station. This coverage consisted of still and motion-picture photography. By the use of laboratory facilities established at the test site it was possible to process, classify, and release coverage to the press within 2 hours after each detonation.

In general support of the participating DOD projects, approximately 5,000 still photographs were made at the test site. Immediate prints were produced for use of projects. Laboratory

facilities were also used to process microfile and oscillograph records as required. Following completion of the test series the still photography was placed in the film library at Headquarters, AFSWP.

Although some photography was lost because of unusually high pressures and radiation levels which destroyed some equipment and fogged some film, the overall technical photographic effect was considered successful.

2.5 OPERATIONS (G-3)

On 12 April 1957, the Operations Office of the DOD Test Group commenced activities at NTS. Activities for this office continued until 27 September 1957.

The activities were concerned with such operational matters as the preparation of operational orders, standing operation procedures, and other operational written material; posting shot sche-

TABLE 2.2 PHOTOGRAPHIC SUPPORT

Shot	Project	Purpose	Shot	Project	Purpose
Franklin	5.2	Blimp effects	Pascal A	9.1	Gross-effect views
	6.3	Cloud tracking	Owens	6.3	Cloud tracking
Lassen	2.10	Kytoon position and effects		2.10	Kytoon positions
Wilson	2.10	Kytoon position and effects		1.2	Rocket launcher and canister positions
	6.3	Cloud tracking	John	9.1	Fireball photography
Priscilla	6.3	Cloud tracking		9.1	Cloud tracking
	1.3	Shock-wave photography	Smoky	6.3	Cloud tracking
	3.6	Dome deflection		1.8	Shock-wave photography
	4.1	Biomedical photography		1.8	Tank-model photography
	8.1	Thermal effects	Stokes	5.2	Blimp effects
	8.2	Skin-simulant effects			
Hood	2.1	Cloud tracking			
	8.2	Skin-simulant effects			

dules; consolidating and submitting event cards for the DOD scientific test projects; and coordinating the movements and activities of the scientific projects on shot days and the evening prior. In addition, the operations office arranged rad-safe training, maintained radiation exposure records, consolidated and followed up timing signal requirements, coordinated billeting requirements for the personnel of the test group, made necessary arrangements for technical observers, and, finally, provided a general information service for all personnel of the DOD Test Group.

2.6 REQUIREMENTS

2.6.1 Organization. During the planning phase of the operation, the Requirements Branch consisted of the Engineering and Construction Section and the Requirements Section. During the operational phase at NTS, the Requirements Section became the G-4 Section and the Engineering and Construction Section became the G-6 Section of the Nevada Test Organization.

2.6.2 Operational Phase. On 10 April 1957, the Requirements Branch established the G-4 and G-6 offices in the DOD compound at Mercury. Beginning in January 1957, members of the Requirements Branch had alternated in maintaining representation at the test site in order to more effectively handle construction and supply problems connected with early activities of the contractors at the test site.

The construction phase of Operation Plumbbob began in early January 1957 with the clean up and decontamination of the ground-zero area. Lump sum contracts were awarded for the construction of the underground structures of Project 3.1 and the arches and domes of Project 3.6. All other construction for the DOD was performed by the AEC contractor, the Reynolds Electrical and Engineering Company.

The bulk of the DOD test construction was concentrated on Frenchman Flat. There were varying amounts of construction in other areas with most of the work outside Frenchman Flat being concentrated in Areas 9 and 2c. Fortunately, the participation in Area 2c was late in the test series, allowing for the maximum effort to be placed on the Frenchman Flat work.

Bad weather in the form of heavy rains during the latter part of April had an adverse effect on construction progress and at one time the major portion of the construction area was under from 6 inches to 2 feet of water. While extra pumps were obtained and the water removed as rapidly as possible, construction progress was set back from 7 to 10 days. Later, during May and June, high winds and dust hampered operations somewhat and slowed down progress.

The desired completion of all contractor construction by 15 May 1957 was met in only a few instances. However, the work was complete enough in practically all cases to allow project personnel to proceed with instrumentation, laying of cables, etc. The last week preceding the scheduled D-day was the normal hectic operation of catching up on overlooked details, filling ditches, and sandbagging. On scheduled D-day, all work had been done and all projects were ready.

After the Frenchman Flat shot, activities slowed down somewhat and were concentrated on the preparations for the tests in Area 2c. This would have been routine except for the fact that the areas had become contaminated. This greatly increased the difficulties, costs, and time required to perform the required construction. However, all work was completed and all DOD projects were ready on the scheduled test date.

Theoretically, the G-6 section conducted all its liaison with the AEC, the architect engineer, and the construction contractors through the G-6 staff of the Test Director. Actually, because of the predominance of DOD interest in the Frenchman Flat area, liaison was largely effected by direct contacts. This relationship and method of operation was generally excellent.

The allocation of laboratory space and generators was a responsibility of the Requirements Branch in collaboration with the Support Group. In general, there were no shortages in this form of support and all projects were adequately supplied.

2.6.3 Miscellaneous. Responsibility for the location of the various Desert Rock test facilities in Frenchman Flat was given to G-6. The actual construction of these facilities was a responsibility given to the engineer company stationed at Desert Rock.

2.6.4 Fiscal. AFSWP funds of $6,724,700 were transferred, by CHAFSWP letter SWPWT 979, subject "Implementation of the DOD Weapons Effects Test Program, Operation Plumbbob", 13 September 1957, to Commander, Field Command, AFSWP, to administer in support of Operation Plumbbob. These funds were distributed by program as listed under Column 1 in Table 2.3. During the period this operation was in progress, projects were added and additional funds committed to the operation. These additional dollars raised the total Plumbbob budget to $7,473,700 and were distributed as listed under Column 2.

2.6.5 Logistics. The Field Command Support Unit stocked expendable and low-cost nonexpendable items of equipment and supplies to fulfill project requirements. Whenever requests were received for items of equipment or supply that were not in stock, arrangements were made to procure these items from Reynolds Electric and Engineering Company or by local purchase in Las Vegas.

2.7 COMMUNICATIONS (G-5)

2.7.1 General. The Communications Branch, G-5, was responsible for the overall coordination of communications matters pertaining to activities of the DOD projects. This included telephone and radio service, clearance of radio frequencies, and operation of radar and electronics systems in the technical program. Two officers and three enlisted men were assigned to the branch.

2.7.2 Radio. The AEC Support Director, through a contractor, provided and maintained 27 mobile radios, 17 handi-talkie radios, 5 base station radios and 18 remote operating units in the DOD radio net. Assignment of this equipment to participating agencies was controlled by

TABLE 2.3 FISCAL DATA

	1 13 Sep 56	2 1 Aug 57
Program 1, Blast Measurements	$1,142,400	$1,016,480
Program 2, Nuclear Radiation	614,000	1,034,370
Program 3, Structures and Equipment	1,235,200	1,188,920
Program 4, Biomedical Effects	295,000	536,822
Program 5, Effects on Aircraft Structures	1,124,000	694,125
Program 6, Tests of Service Equipment and Materials	319,500	1,024,900
Program 8, Thermal Radiation and Effects	194,600	211,350
Program 9, Support Photography	650,000	754,755
AFSWC Project 73.1	—	46,000
SRI Project 26.4A	—	70,000
ERDL Project 26.4E	—	40,000
DOD Support	600,000	150,000
Field Operating Costs *	180,000	79,797
Reports	45,000	45,000
Contingency	325,000	581,181
TOTAL	$6,724,700	$7,473,700

* Not identifiable with a project.

G-5. In addition, the AEC Support Director furnished 2 mobile radio units in the Holmes and Narver construction net to Requirements Branch, G-6, and 1 mobile radio unit in the security net for the Security Branch.

The AEC Support Director accepted maintenance responsibility for a radio communications system provided by Lookout Mountain Laboratory, releasing several maintenance personnel which the Laboratory had planned to have at NTS.

The Communications Branch provided Project 5.2 an AN/ARC-27 UHF communication radio set mounted in a vehicle to control airships flown into NTS. Since this radio unit was peculiar to the Service, arrangements for maintenance were made with the Armament and Electronics Squadron at Nellis Air Force Base.

Radar and communication equipment for the control of aircraft participating in the operation was provided and maintained by the 4950th Test Group (N), Kirtland Air Force Base. This organization also provided two low-frequency homing beacons, one 25-watt unit at Yucca Flat and one 400-watt unit at Lathrop Wells, Nevada.

The Signal Corps unit, Camp Desert Rock, provided and maintained radio communications systems used by Exercise Desert Rock VII and VIII. This unit also provided a radio teletype system which fed into the ACAN and the U. S. Sixth Army systems.

Coordination of radio frequencies was a continuing problem throughout the operation, with 216 frequencies being cleared for all DOD activities.

2.7.3 Radar. Three AN/MSQ-1A type radar sets were provided and operated by the Air Force for positioning test aircraft.

The Navy provided and operated three Antiaircraft Fire Control System radars Type M-33, modified to position and track test aircraft. The acquisition portion of each of these radars was not used.

The Army provided and operated two Nike-Hercules radar systems in a test of missile guidance systems.

Exercise Desert Rock VII and VIII Operational and Training Projects provided and operated the following types of radars: 1 each AN/CPS-9, 1 each AAFCS M-33, 2 each Nike Ajax, 1 each AN/MPQ-10A, 1 each AN/MPQ-21 and 2 each MK 10 IFF.

The number of radar sets operating at NTS presented many radio frequency interference problems both in operation of radar and diagnostic measurements systems. These problems became so acute that a decision was made by the Test Director and the DOD G-5 that some type of frequency monitoring equipment was essential for continued participation of this number of radar units during the remainder of the operation. G-5 requested Field Command Communication Operations Branch to check availability of some type of monitoring equipment or system in its area. It was found that a mobile monitoring system had recently been completed at Holloman Air Force Base, New Mexico. Further communication with the Area Frequency Coordinator, White Sands Proving Ground, New Mexico, enabled G-5 and the Test Director to secure loan of this equipment and operating personnel. Use of the equipment proved invaluable during the remainder of the operation.

2.7.4 Telephone. The basic dial telephone system was provided by the AEC Support Director through contract service with Bell Telephone System of Nevada. Approximately 87 dial lines were utilized in the Mercury Area and 37 dial lines in the forward area.

Full-period direct lines were installed between the following agencies:

Air Operations Center, Indian Springs AFB
Kirtland AFB with interconnect capability to Sandia Base
Air Force Radar Site, Indian Springs AFB
Navy Radar Site, Indian Springs AFB

These lines were installed primarily for operational control of aircraft. During nonoperational periods, these lines (principally the AOC-ISAFB-KAFB line) were used for administrative purposes, which assured as little idle time as possible. It is estimated that the AOC-ISAFB-KAFB full-time line paid for itself many times in eliminating long distance toll charges that would otherwise have been incurred.

Exercise Desert Rock VII and VIII installed and maintained their own field telephone facilities in the forward area with two spiral-four circuits connecting Camp Desert Rock switchboard to their forward area switchboard. It is estimated that approximately 1,000 miles of wire were installed by the Camp Desert Rock Signal Agency.

One field telephone switchboard was installed and maintained by the Communications Branch. This system provided Project 4.1 communications between Camp Mercury Animal Storage Area and animal pens on Frenchman Flat.

2.7.5 Teletype. The AEC Support Director provided, maintained and operated teletype facilities, both classified and unclassified, for general message service. This service was available during normal duty hours and operational periods. At other times an operator was available on call.

2.8 REPORTS

Two offices of the Reports Branch were maintained during the operational period of Operation Plumbbob: a field office at NTS under the DOD Test Group and the home office at Sandia Base. The NTS office was staffed with an editor, analysis officer, and several draftsmen-illustrators; the home office was operated by the regular editorial-production section of the Reports Branch.

The primary functions of the NTS office were to (1) review first the Pretest and then the Interim Test Report (ITR) drafts for both editorial and technical content; (2) assign distribution categories based on predetermined listing prepared at Headquarters, AFSWP; (3) prepare from author's rough drawings all final artwork which was to appear in the report; (4) administer the reports program with respect to routing for review, approval, final security classification, etc.; and (5) maintain a basic file of published weapon-test reports for the convenient reference of DOD test-group personnel.

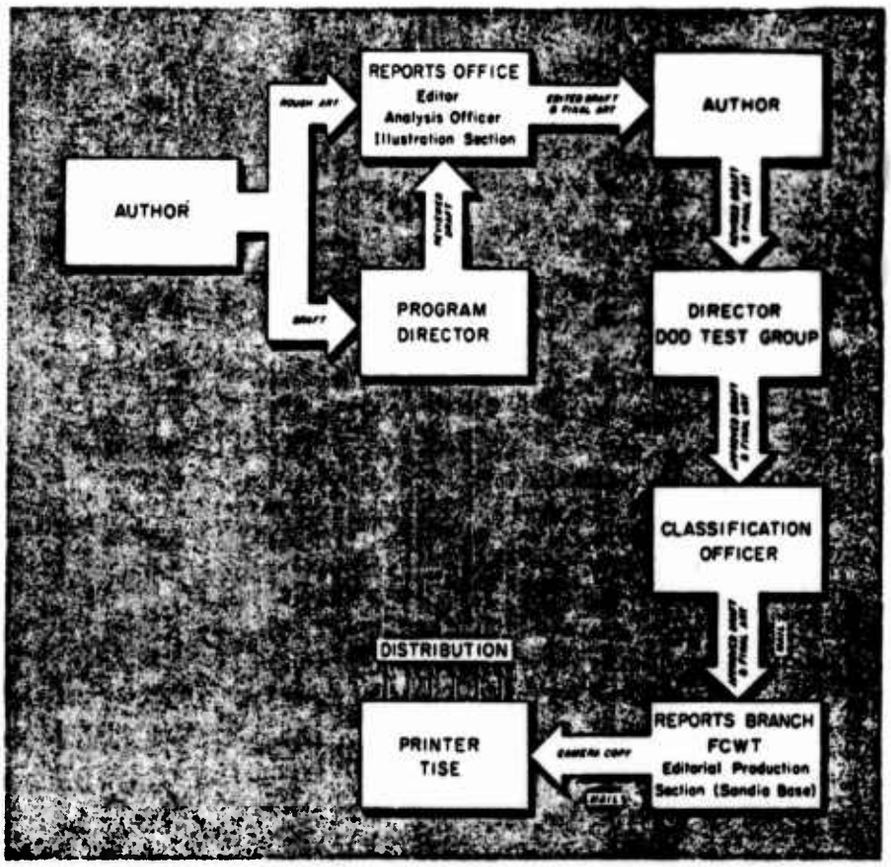


Figure 2.3 Basic steps in processing of Interim Test Reports (ITR's).

When the test-site processing was completed and the report approved for publication by the Director, DOD Test Group, the report was transmitted to the Sandia Base home office where it was prepared for printing. This step included the type composition of galleys, page makeup, sizing of artwork, etc. The camera copy so prepared was then sent to the Technical Information Service Extension, USAEC, Oak Ridge, Tennesee, which prints and distributes all reports within the weapon-test series. A total of forty-five project ITR's and two summary reports was handled during the summer and autumn, 1957. The processing of the Operation Plumbbob ITR's is illustrated in Figure 2.3.

Chapter 3
FIELD COMMAND SUPPORT UNIT

3.1 MISSION AND ORGANIZATION

The DOD Support Group (Field Command Support Unit) functioned as an organizational element under the Office of the Test Manager (Figure 3.1). The Deputy for Military Matters (Deputy Chief of Staff, Weapons Effects Tests) exercised operational supervision over the Field Command Support Unit through the Officer-in-Charge, Field Command Support Unit. The mission of the Field Command Support Unit was to provide administrative, logistical and general support to DOD/AFSWP project agencies, activities and personnel participating in continental tests at NTS. The Unit was organized to provide both base command and supply depot type requirements to authorized DOD participants. In addition, limited logistical support was furnished the AEC under authority contained in instructions to Commander Field Command, AFSWP, from the Chief of AFSWP for implementing Operation Plumbbob. Primarily, assistance to the AEC at NTS consisted of providing special items of supplies and equipment on a loan basis from available AFSWP assets at the site.

Inasmuch as the highest percentage of support requirements were generated by DOD projects, the Field Command Support Unit performed its mission principally by direct telephone and personal contact with the Director, DOD Test Group, the DOD Program Directors, and the Project Officers.

The Officer-in-Charge, Field Command Support Unit, maintained close coordination with the AEC Support Director regarding matters of joint responsibility and mutual interest. Satisfactory solutions were reached on all problems of operational importance.

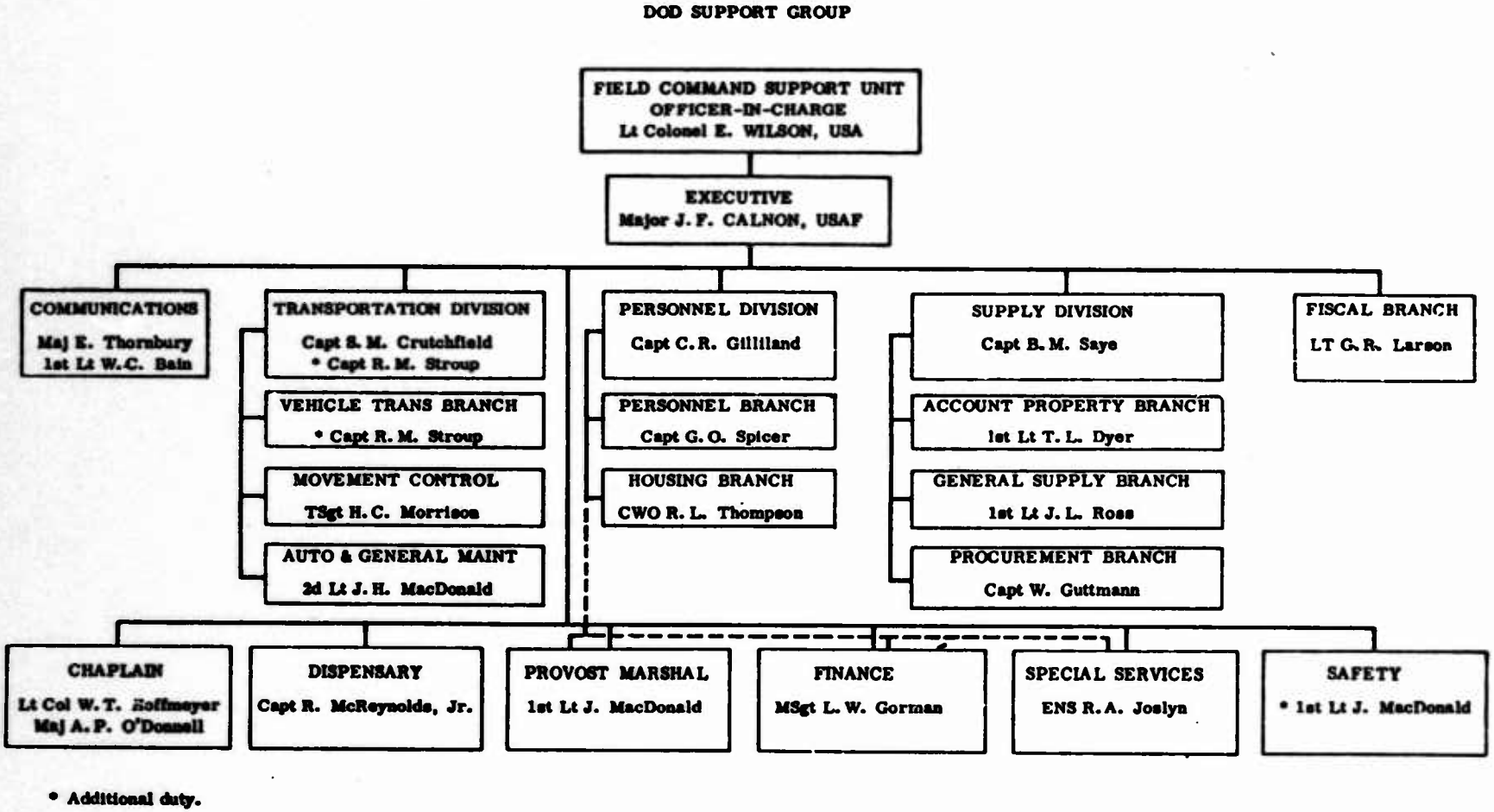
3.2 SUMMARY OF OPERATIONAL ACTIVITIES

3.2.1 Communications. The Communications Officer, Field Command Support Unit, was responsible for arranging telephone and other post, camp, and station-type signal service for the DOD elements participating in Operation Plumbbob. The primary mission of the Communications Division, Field Command Support Unit, was performed in support of the test projects for and under the supervision of the Director, DOD Test Group.

3.2.2 Transportation. The DOD Motor Pool was activated 1 April 1957 and was responsible for operational control, and for dispatching and servicing all DOD-owned vehicles at NTS including those which accompanied the projects from their home stations. Vehicle assets under the control and jurisdiction of the Field Command Support Unit Transportation Division consisted of:

	AFSWP Owned	Project Owned	On Loan	Total
Motor Vehicles	199	77	41	317
Trailers	42	17	5	64
Totals	241	94	46	381

Dispatch and other administrative functions were accomplished in the normally prescribed manner except that weekly dispatches of vehicles were made to some users on a continuing basis,



* Additional duty.

Figure 3.1 Field Command Support Unit organization.

when justified. During the peak operational period, the following vehicles from sources indicated were utilized on temporary loan:

AFSWP Equipment Pool (Field Command),	31 tactical cargo trucks
AFSWC (Kirtland AFB),	6 tactical cargo trucks
Camp Irwin, California,	5 tactical water trailers
Test Manager, AEC,	4 passenger vehicles

DOD vehicle assets were initially distributed as follows:

DOD Test Group,	234 (including 21 trailers)
FCSU,	15
Operations and Training,	9
Motor Pool,	123 (including 43 trailers)

Motor Pool vehicles were dispatched daily. They provided the cushion for maintenance of permanently allocated vehicles and were used extensively in support of the AEC Visitors' Bureau.

Commercial Traffic Branch. This activity was organized and operated in conformity with a military base or post traffic section and performed the following functions: (1) courier service to Las Vegas Municipal Airport, DOD Las Vegas Procurement Officer, and Nellis Air Force Base; (2) commercial carrier reservations for DOD personnel; (3) packing, crating and shipment of DOD materiel; (4) receipt and delivery of incoming and outgoing shipments; and (5) tracing and expediting cargo movements.

The Commercial Traffic Branch handled and/or processed approximately 2,200 pieces (343 tons) of outgoing shipments and 1,475 pieces (280 tons) of incoming shipments during the major active period of DOD participation in the test series. Approximately 135 government bills of lading were issued obligating between $15,000 and $16,000 for transportation costs.

Motor Maintenance. The Field Command Support Unit Vehicle Maintenance Shop provided maintenance service and repair for all DOD administrative vehicles and generators assigned to NTS. Maintenance service through third echelon was provided, together with machine shop services of a comparable nature. The maintenance activity removed vehicles from long-term storage at the beginning of the operation, and replaced vehicles in long-term storage at the conclusion of the operation. Records indicated an expenditure of $58.00 per vehicle for the in-and-out-of-storage operation, including labor and materials.

A total of 86 generators, ranging in capacity from 1½ to 75 kw, were on hand for assignment. During the peak period of operation, a total of 38 generators were assigned. The generators were serviced and maintained by the maintenance shop generator section, consisting of five enlisted men. Two enlisted men were assigned as gasoline tank truck drivers and the other three were utilized as generator mechanics and service personnel. Because of the frequency of location change of the generators, adverse operation conditions, and wide dispersal of locations, the five personnel were fully utilized.

Parts support for the maintenance activity was provided by both normal warehouse issues and local procurement. Prior to the operation, stock levels were established on the basis of past operation consumption data. Local procurement of commercial parts was relatively simple and common items could normally be obtained within 24 hours. Peculiar items on tactical vehicles presented a far greater problem which, in some cases, caused excessive deadline time.

The average daily deadline percentage during the operational period was 1.6 percent. The large portion of deadline vehicles was accounted for by borrowed tactical vehicles which were received in poor condition.

The Maintenance Shop was manned by 1 officer and 44 enlisted men. One officer and three enlisted men were brought in as an Ordnance unit. The balance were permanent party and augmentation personnel.

3.2.3. Personnel. Military and civilian personnel required to accomplish the DOD/AFSWP mission for Operation Plumbbob were obtained in the following ways.

Personnel were provided by participating agencies and activities in implementation of their own test objectives. All assigned personnel from Weapons Effects Tests group, Field Command, AFSWP moved to NTS for the operation.

The Field Command Support Unit Motor Maintenance activity was augmented by a detachment of 1 officer and 39 enlisted men.

Augmentation military personnel were provided by the three Services as requisitioned by Commander, Field Command, AFSWP (Deputy Chief of Staff, Weapons Effects Tests), through Chief, AFSWP. A total of 13 officers and 147 enlisted personnel was requisitioned by military specialty codes to fill specific positions.

Military and civilian personnel were provided by the Commanding Officer, Sandia Base, to perform specified services. This category included a Finance Office at the site staffed with six enlisted men and one civilian, during the peak operational period, and one typewriter repairman during the roll-up period. Four enlisted men were furnished for duty with the DOD Medical Dispensary activity at the site.

The Public Information Officer, Field Command, AFSWP, was placed on temporary duty at the Las Vegas Branch Office, AEC, to perform the Public Information Office mission of the Commander, Field Command, in coordination with the AEC Public Information Officer.

The Assistant Surgeon, Field Command, AFSWP, performed duty at the Test Site to direct and monitor the orientation and training program for medical officers from the three Services.

Utilization of the augmentation personnel from the sources indicated above was as follows:

Duty Assignments by Activity

Activity	Officers	Enlisted	Total
Headquarters Field Command Support Unit (including Medical and Finance personnel)	7	25	32
Supply and Procurement	2	15	17
Maintenance	1	38	39
Transportation	1	41	42
Security (including Military Police)	2	5	7
DOD Test Group	1	13	14
DOD Visitors' Bureau	4	3	7
DOD Communications	1	4	5
DOD Operations	2	2	4
DOD Public Information Office	1	4	5
Totals	22	150	172

3.2.4 Billeting. The DOD Housing Office was located in Building 111 and was staffed by one Navy Chief Warrant Officer and two enlisted clerks. Its function was to assign billets to DOD/AFSWP military and civilian participants in the operation. All assignments, terminations and related actions were under the general supervision of the Director, Personnel Division, Field Command Support Unit. Continuous coordination was maintained with the Reynolds Electrical and Engineering Company Housing Office also located in Building 111.

Billets were assigned to the personnel of the Field Command Support Unit and Headquarters, DOD Test Group, on a semipermanent basis, since they were generally on duty at the site during the entire operational period. Project personnel were provided billets as required, in coordination with the Commander (G-3), DOD Test Group. During the peak period, the following number of individuals were billeted (as of 23 June 1957):

Military	721
Civilian	226
Total	947

The following dormitories were under the assignment control of the DOD Billeting Office: F, W; 507, 513, 514 and 515. Forty-eight spaces were utilized in the DOD hutment area. In addition, 97 trailers having a 3-man capacity were available to the DOD Billeting Office during the peak population period.

3.3 SUPPLY AND PROCUREMENT

The General Supply Branch, Supply Division, Field Command Support Unit, began operations at NTS on 18 February 1957, and was charged with the mission of providing depot and post, camp and station type supply support to DOD/AFSWP participating agencies and activities, including 50 test projects.

The DOD projects submitted all requirements for supplies and equipment to the FCSU General Supply Officer. The supply officer met requirements by obtaining items, as appropriate, from the FCSU accountable officer, the FCSU Las Vegas procurement office, and the AEC stocks. Some items were received on a return-in-kind basis from Indian Springs AFB and Nellis AFB.

Supplies and equipment were requisitioned by the accountable officer from technical service supply sources and General Services Administration during the period January through December 1957. The majority were consumed during the test operational period. A portion of the items were for stock replenishment of supplies previously issued from available assets.

Additional supplies and equipment were obtained from Reynolds Electrical and Engineering Company at NTS. Those items consisted primarily of diesel fuel, packing and crating materials and services, and miscellaneous supply and service requirements of the test projects.

The Las Vegas DOD Purchasing Office of AFSWP Account No. 1006-SO began its procurement activities on 1 April 1957 at 700 South Main Street. The Las Vegas Branch Office, AEC, provided the office and receiving space by rental from a commercial source. Between 1 April 1957 and 31 July 1957 (its closing date), the Las Vegas Purchasing Office accomplished procurement of approximately 2,200 line items of supplies and equipment.

Considerable difficulty was experienced by the Purchasing Officer in effecting timely procurement of numerous items from local vendors. The Las Vegas merchants did not maintain adequate stocks either as to type or quantities of items to meet test project requirements during a test operational period. Many items needed were not normally utilized in the local commercial field and procurement action was necessarily accomplished from West Coast sources, and, in a few instances, from the manufacturers. Consideration should be given in future continental tests toward having the Purchasing Officer appoint an authorized Contracting Officer, in order that he may negotiate directly with manufacturers and distributors, rather than having to rely on local procurement procedures.

Between 1 January 1957 and 1 January 1958, supplies, equipment and services with a value of $356,000 were obtained by FCSU, FCWT, for the operation. Source of supply was as follows:

Army Depots	$110,000
Field Command Purchasing and Contracting	33,000
General Services Administration	74,000
Las Vegas Procurement Office	96,000
Reynolds Electrical and Engineering Company	43,000
Total	$356,000

The nature of items purchased is indicated by the following analysis, in thousands of dollars:

Ordnance	
Combat vehicle parts	32
Commercial vehicle parts	38
Maintenance shop equipment	6
Trailers, van type	8
Other	11
	93

Engineer	
Generator repair (Clearfield NSC and REECO)	23
Drafting supplies and equipment	4
Concertina wire	3
Ozalid machine	3
Air conditioners	3
Other	8
	44
General Administrative	
Including services	37
Safes for classified files	4
Packing and crating	28
Personnel and equipment assistance	3
	72
Signal Corps	
Wire and cable	5
Telephone service	6
Tape recorders	1
Installation of radios	3
Other	5
	20
Chemical Corps	1
Medical Corps	
Supplies	4
Litter for ambulance	1
	5
Petroleum Oil and Lubricants	
Gasoline and oil	32
Diesel fuel	5
	37
Special Items for Research and Development	
Stereopticon machine	3
Ice and hay	3
Tents	57
Cal seal	2
Instrument batteries	7
Other	9
	81
Total	356

3.4 FISCAL

Funding authorizations from Chief, AFSWP, for extra-military costs in connection with Operation Plumbbob totaled $1,523,000. The allocations were received and adjusted by several funding transactions during fiscal years 1957 and 1958. The following recapitulation reflects receipts, obligations, and expenditures of extra-military funds for the operation:

Total Receipts	$1,523,000
Total Expenditures	1,245,600
Estimated Surplus	277,400

Expenditures by Object Class:	
02, Travel and per diem	$465,000
03, Transportation of things	3,100
04, Communications services	4,500
07, Contractual services	1,000
09, Equipment	15,000
99, Direct funding	757,000
Recapitulation of Direct Funding:	
AFSWC	387,000
Obligation authority, NTS	235,000
AEC	75,000
Camp Irwin	55,000
White Sands	5,000
Total	$757,000

Expenditures under Object Class 02 were appreciably greater than originally anticipated, because of the long operational period of the test series. It was expected that a savings of approximately $200,000 would be effected from the total amount allocated by Chief, AFSWP.

3.5 AUXILIARY SERVICES

3.5.1 Military Police Unit. The mission of the Military Police Unit during test operations at NTS was to preserve order among personnel of the Armed Forces, enforce military regulations and directives pertaining to conduct, and to require observance of civil laws and ordinances by military personnel within NTS.

In performance of the above mission, the unit consisted of one Military Police Officer, Army (MOS 9110), one Military Police Sergeant (MOS 951.6), and two Military Police Specialists (MOS 951.1). Personnel of the Military Police Unit functioned in close liaison and coordination with the following military and civilian organizations: DOD/AEC Security Office, Camp Desert Rock Military Police, Indian Springs AFB Air Police, Nellis AFB Air Police, Nye County Sheriff's Office at NTS, Nevada Highway Patrol.

During the period 1 April 1957 through 21 August 1957, on which date the unit was inactivated, the military police participated in the following law enforcement actions, in the number of incidents indicated: larceny, 15; drunk and disorderly, 1; uniform violations, 5; and traffic offenses, 30.

3.5.2 Special Services Unit. The Special Services Unit provided recreational support to all DOD military and civilian personnel on duty at NTS. During the period of peak population, the unit was staffed by one Navy Ensign and two Air Force enlisted men.

Facilities were available for horseshoe games, volleyball, golf (practice range only), badminton, and softball.

Equipment was maintained and issued in adequate quantities for all the above listed sports, for fishing, and for water sports. In addition, three 14-foot fiberglass boats, with outboard motors, were docked at Lake Mead, and were issued for fishing and other recreational purposes on a reservation basis.

A library of approximately 400 books and periodicals was available. Reading material was issued on both loan and exchange basis, depending on the type and expendability of the item involved. The Sandia Base Special Services library loaned 400 books for the operation.

Recreational buses to Las Vegas, Boulder Dam, and other points of interest were authorized and provided, primarily on week ends.

Show and dinner reservations at clubs in Las Vegas were also functions assigned to the Special Services unit.

3.5.3 Finance Unit. The finance activity provided payment of travel and per diem allowances to all DOD military and civilian personnel at the test site. Regular monthly pay was not handled by the unit. The Class B Finance Officer (additional duty for Director Personnel Division, Field Command Support Unit) utilized an average of five military enlisted and civilian clerks during the period of operation from 1 April through 28 September 1957.

Cash payments for travel and per diem were made each two weeks to those who wished to draw their allowances regularly. Emergency payments were accomplished when appropriate.

Partial statistics of the Finance Unit's activity are as follows:

Average daily man-hours worked, Military, 8.91
Civilian, 8
Number of vouchers processed, 5,637
Total disbursements, $528,921.69

3.5.4 Religious Services. One Protestant Chaplain and one Catholic Chaplain provided religious services at the Site. Each Chaplain was assisted by an enlisted man; all personnel were augmentation and the Chaplains were rotated on thirty-day tours from Field Command, AFSWP, Sandia Base.

Protestant worship services were conducted twice on Sunday mornings. Total attendance at the twenty-four services held was approximately 400 persons. Two weddings were performed.

The Catholic Services conducted totaled 111, including Sunday and week-day masses, and a Novena. Attendance for all services was approximately 3,200.

The Chaplains conducted interviews and provided counseling. Visits to the sick in quarters and hospitals were made. Liaison was maintained with civilian clergy in the area.

Services for personnel of the Jewish faith were not available at the test site. However, government bus service was furnished for those indivuals desiring to attend Jewish services in Las Vegas.

The DOD Support Group (FCSU) was informally inactivated on 15 October 1957.

Chapter 4
EXERCISE DESERT ROCK VII and VIII

4.1 INTRODUCTION

Exercise Desert Rock VII and VIII was the U. S. Army program for troop participation and observers in Operation Plumbbob. As a continuation of similar programs in previous continental tests, the exercise was designed to provide orientation and indoctrination for selected individuals in the effects of atomic weapons and to conduct specified troop tests of doctrine, tactics, techniques and equipment.

Camp Desert Rock, located about two and one half miles southwest of Mercury, Nevada (Figure 4.1), is a Class I installation under the Command of the Commanding General, Sixth U. S. Army. During the Desert Rock Exercise Phase (15 May 1957 to 30 September 1957) the camp averaged a permanent party of approximately 75 officers and warrant officers and 1,400 enlisted men. On 1 October 1957, the camp reverted to the close-out phase, and the station complement was gradually reduced to a size commensurate with the necessary guard and maintenance duties.

The Deputy for Military Matters on the staff of the Test Manager was charged with the responsibility of coordinating the Camp Desert Rock activities on NTS. Assistance in the discharge of this responsibility was provided by the Coordinator of Desert Rock Exercises, who functioned on the staff of the Test Manager under the Department of Defense Operations Coordination Group. Through this office, the Desert Rock program was integrated into the overall AEC-DOD test operations.

4.2 PREOPERATIONAL PLANNING

Exercise Desert Rock VII and VIII came into being on 5 September 1956, when a conference was held in Washington, D. C. to formulate tentative plans. Troop, observer, and project participation was discussed and agreement was reached that the entire exercise would be coordinated with the Nevada Test Organization through Field Command, AFSWP.

Throughout the next six months, planning and coordination continued with frequent exchange of ideas between Commander, Field Command, AFSWP, and the Director of Exercise Desert Rock VII and VIII, the Commanding General, Sixth United States Army, and the Deputy Exercise Director, the Commanding General of Camp Irwin, California, and its satellite, Camp Desert Rock, Nevada.

During this time, the most important events were (1) a conference at Lexington Signal Depot, Lexington, Kentucky, on 23 and 24 October 1956 at which arrangements were made for the Signal Corps Film Badge Service to handle all film badge dosimetry for Exercise Desert Rock by conducting a portable service at the camp; (2) construction of a VHF radio relay station on Hill Smoky, Sr., NTS, to provide two-way communication with radio-equipped vehicles operating in the test area and under the jurisdiction of Exercise Desert Rock; (3) a conference at Headquarters, Field Command, AFSWP, on 14 and 15 November 1956, attended by representatives of CG Continental Army Command (CONARC), CG Sixth U. S. Army, Director Exercise Desert Rock, and Commander Field Command, AFSWP, at which all plans formulated to date were discussed; and (4) construction of an airship mooring mast at Camp Desert Rock to assist the DOD Test Group in its program on aircraft effects.

During the preoperational and planning phase of Operation Plumbbob, a system was developed in which the only contact between the two operating groups (Camp Desert Rock and Nevada Test Organization) was through the Coordination Group. In this manner, activities were channeled to the individuals involved and duplication of operational effort eliminated.

In general, the procedure was that the Chief of Operations on the staff of the Commanding General of Camp Desert Rock (the Deputy Exercise Director) would inform the Coordination Group of the requirements of a given project as to real estate, use of road net, manned stations, operational control, etc. The Coordination Group would conduct a ground reconnaissance, determine suitable locations, verify noninterference with technical projects and formally request the Test Director for concurrence in the given project. When the Test Director saw no conflict between a project of Exercise Desert Rock and any technical project, the Coordination Group

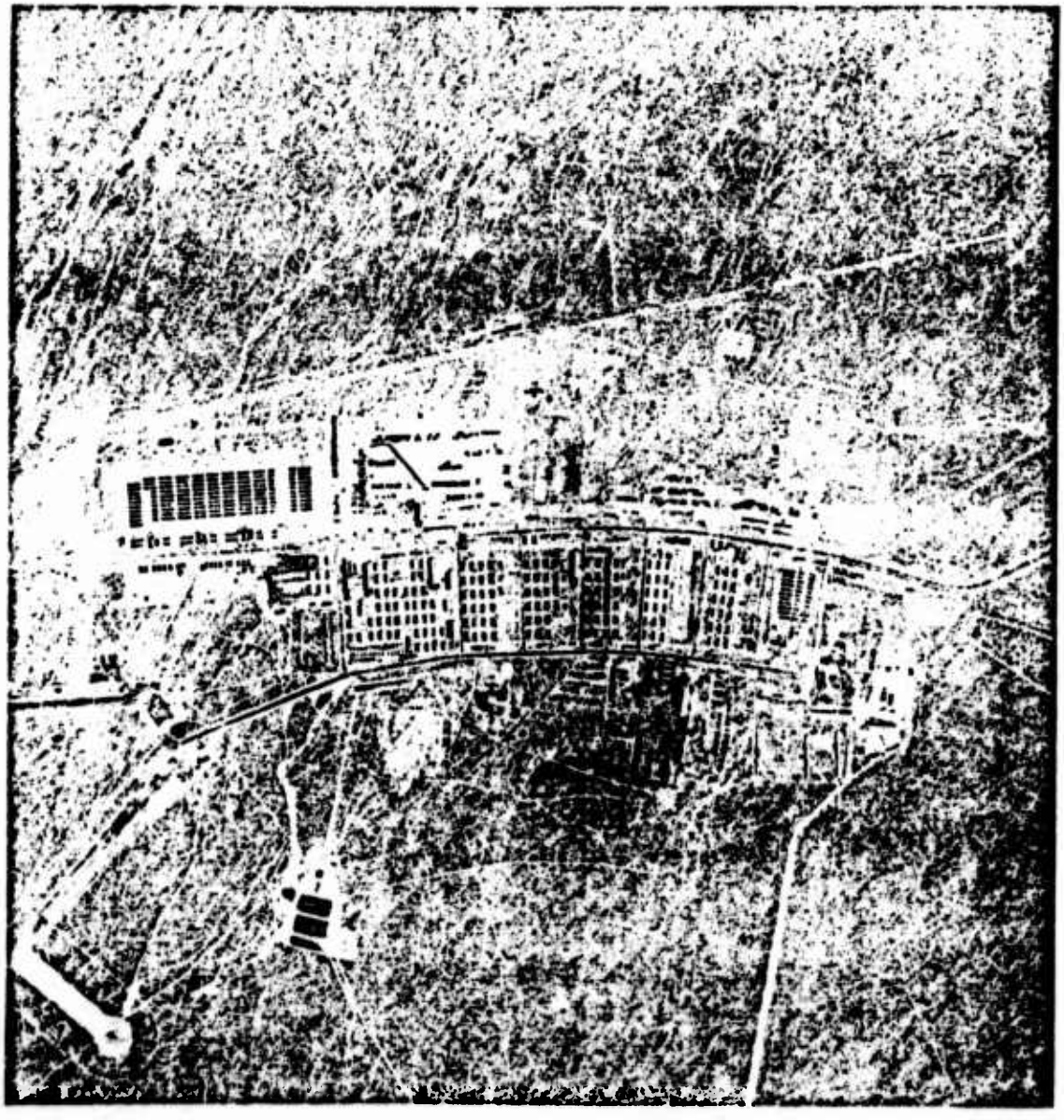


Figure 4.1 Camp Desert Rock, 1957.

would so inform the Deputy Exercise Director.

As a result of this coordination, the Chief of Operations of Camp Desert Rock would prepare an Operation Plan for a given shot and submit it to the Test Manager for approval through the Coordination Group. If approved, the Operation Plan would become the Exercise Desert Rock Operation Order and its execution would be monitored by the Coordination Group to prevent un-

foreseen conflicts. To facilitate the execution of the order the Coordination Group maintained a Command Post on shot nights, together with a designated staff member of the Deputy Exercise Director in the Control Point near the coordination center of the Test Director's Operations Chief. This system was found to be effective both in controlling the Desert Rock operation and in eliminating friction with other agencies.

4.3 SAFETY

By agreement between the DOD and AEC, the Exercise Director of Exercise Desert Rock assumed full responsibility for the safety of participating troops and observers.

The following criteria were established by Commanding General, CONARC, as the maximum limits to which Exercise Desert Rock personnel would be exposed when participating in peacetime training and troop tests conducted in conjunction with atomic weapons tests.

Overpressure: 3 lb/in^2

Nuclear radiation: 5 roentgen equivalent mammal (rem) at any one test of which no more than 2 rem is prompt, whole-body radiation; provided further that no individual would receive more than 5 rem in any 6-month period.

Thermal radiation: two thirds times the calories per square centimeter ($^2/_3$ Q) necessary for a first degree burn on bare skin.

On the basis of the above exposure limits, the following troop positioning criteria were used for Exercise Desert Rock personnel (distances given to be measured from intended ground zero):

Max. Predicted Yield (kt)	Troops in Open (yds)	Troops in Trenches (yds)	Troops in Armored Vehicles (yds)
0.1	1,700	1,400	1,600
0.5	2,100	1,700	2,000
1	2,300	1,900	2,200
2	2,500	2,100	2,300
5	3,000	2,300	2,600
10	4,000	2,600	2,800
20	5,200	3,100	3,100
30	6,200	3,500	3,500
40	7,000	3,900	3,900
50	7,600	4,200	4,200
60	8,200	4,400	4,400
70	8,700	4,700	4,700
80	9,200	4,900	4,900
90	9,600	5,100	5,100
100	10,200	5,300	5,300

Trenches provided for troops and observers were at least 6 feet deep and all participants were instructed to keep below a point at least 2 feet below ground level.

The Deputy Exercise Director was not authorized to position personnel closer to ground zero than provided above. The Deputy Exercise Director was authorized to station all or part of the troops and troop observers at distances from ground zero greater than provided above under the following circumstances: (1) in the event an adequate evacuation plan could not be implemented from the positions specified; (2) in the event special circumstances arose at the test site which, in the opinion of the Deputy Exercise Director, would jeopardize the safety of personnel if located at the specified positions.

4.4 SECURITY

The minimum security clearance requirements for military and civilian personnel assigned for duty and participating in Exercise Desert Rock VII and VIII were as follows:

Secret: (1) all commissioned and warrant officers; (2) all enlisted observers; (3) all other personnel participating in the exercise who had access to restricted areas except those enlisted personnel who had access to restricted areas only as members of participating groups.

Confidential: (1) all personnel not covered in above, assigned for duty and participating in Exercise Desert Rock VII or VIII who had no access to restricted areas, and did not otherwise have access to information classified above Confidential; (2) enlisted personnel who had access to restricted areas only as members of participating groups, i. e., maneuvering troop units.

4.5 DESERT ROCK ACTIVITIES

Exercise Desert Rock VII and VIII involved participation in 24 events with a total of 20,103 personnel taking part in 12 projects (see Table 4.1). In addition, approximately 150 individuals under the supervision of the U. S. Navy Bureau of Yards and Docks (Project 51.1) received monitor training in contaminated areas and ten CBR teams involving 110 individuals from the Sixth U. S. Army area and six radiological teams from the Canadian Army involving 124 individuals witnessed a shot and practiced their radiological safety procedures. In general, observer participation consisted of the occupation of trenches at the minimum safe distance prescribed by CONARC, prior to detonation time and, after detonation, the inspection of display items within an assigned area, as radiological safety conditions permitted.

On Shot Hood, the Fourth Marine Corps Provisional Atomic Exercise Brigade observed the detonation from trenches and then conducted a planned maneuver involving the use of helicopter airlift and tactical air support.

On Shot Doppler, a battle group of the 12th Infantry Regiment, 4th Division, witnessed the detonation from trenches, and then conducted a planned maneuver in conjunction with Shot Smoky. This maneuver comprised a test of the Reorganization of Current Infantry Division (ROCID) battle grouping and the lifting by helicopter to a forward objective.

The participating projects of Exercise Desert Rock VII and VIII were as follows:

United States Army, Program 50.
- 50.1 Combat Team Exercise[1]
- 50.2 Troop Observers[2]
- 50.3 Evaluation of Medium-Range Detonation-Detection and Cloud-Tracking Systems
- 50.4 Evaluation of Water-Decontamination Methods
- 50.5 Field Evaluation of Shielding for Engineer Heavy Equipment
- 50.6 Test of Field Fortifications
- 50.7 Test of Ordnance Corps Materiel
- 50.8 Troop Test of Atomic-Burst-Locator Equipment
- — Sixth U. S. Army CBR Teams (Rad-Safety)[3]

United States Navy, Program 51.
- 51.1 Rad-Safety Monitor Training[4]

United States Marine Corps, Program 52.
- 52.1 Marine Brigade Exercise[1]
- 52.2 Troop Observers[2]

United States Air Force, Program 53.
- 53.3 ADC Air Crew Observers[2]
- 53.4 Radiological Defense Training

[1] Included in Table 4.1, Troop Units.

[2] Included in Table 4.1, Observers.

[3] Not included in Table 4.1; involved 110 additional personnel.

[4] Not included in Table 4.1. The duration of orders expired and this group departed Camp Desert Rock before the first shot was fired; 150 personnel involved.

Royal Canadian Army and Air Force, Bobcat.
Operation Bobcat I to III[2]
Operation Bobcat IV[1]
Radiological Teams[5]

4.6 PROJECT PARTICIPATION

Following is a resume of the programs of Exercise Desert Rock VII and VIII. The Exercise Director was responsible for the overall supervision and coordination of the projects and furnished supplies and equipment, while each project furnished its own immediate supervisor. For numbers of personnel involved and shot participation see Table 4.1. For the ultimate results of specific projects see the Final Report of Operations of the Exercise Director. Reference Maps 1:50000—Map 1, Tippipah Spring, Sheet 2758 II, AMS Series V796; Map 2, Cane Spring, Sheet 27571, AMS Series V796; Map 3, Frenchman Lake, Sheet 2857 IV, AMS Series V796. All trenching was left for future use, and all equipment was removed from display areas.

4.7 UNITED STATES ARMY, PROGRAM 50

4.7.1 Project 50.1 Combat Team Exercise (Infantry Battle Group Test). The controlling agency was the Deputy Exercise Director, Exercise Desert Rock VII and VIII. The purpose was (1) to determine troop support, materiel, and equipment required to construct a battle group defensive position for protection from an atomic explosion; (2) to determine tactical doctrine, organization, planning data, and helicopter requirements for movement of an infantry battle group by helicopter to seize a deep objective in conjunction with use of an atomic weapon; and (3) to determine techniques and procedures necessary to effect re-supply, by helicopter, of an infantry battle group. The objectives of Phase I were to determine: (1) fortifications and additional equipment required by an infantry battle group to prepare a defensive position against an atomic attack; (2) doctrine and procedures pertaining to this form of defense; and (3) time required to establish a defensive position when attack is imminent. The objectives of Phase II were to determine the suitability of doctrine, tactics and techniques set forth in draft U. S. Army Field Manual 57-35 for rapid movement of an infantry battle group by helicopter in conjunction with employment of an atomic weapon. The objectives of Phase III were to determine the suitability of doctrine and techniques set forth in draft FM 57-35 and Supplemental Logistical Instructions, The Infantry School, for helicopter-borne re-supply of an infantry battle group. Phase I was a nonfiring exercise in which a reinforced infantry battle group moved from an assembly area to a position on the atomic battlefield and prepared a perimeter defensive position as part of an infantry division in a mobile defense. The battle group was the target of an atomic warhead. Evaluation was made of damage to the positions and actual materiel. Estimated personnel casualties were determined at the termination of this phase. The atomic weapon was actually the test device detonated at ground zero. The battle group had been withdrawn to an area in the rear of the prepared position prior to the detonation, after leaving required TOE items on position. Phase II was a nonfiring exercise in which an infantry battle group in a defensive position was assembled and moved by helicopters to seize a deep objective in conjunction with the employment of an atomic weapon. Approximately 4,900 feet of trenching, 6 feet by 2 feet, in compliance with CONARC safety standards, were constructed in the vicinity of Coordinate 841118 (Map 1), together with revetments for two ¼-ton and two 1-ton vehicles, and approximately 1,000 feet of trenching in the vicinity of Coordinate 846032 (Map 1). This exercise was planned for and executed on Shot Smoky. The trenches were to be occupied by observers and the maneuvering troops were to be stationed on high ground to the rear, nearer to the planned helicopter loading zone. However, because of the predicted fallout pattern, Operation Plan B

[5]Not included in Table 4.1; involved 124 additional personnel.

TABLE 4.1 OBSERVER, TROOP, AND PROJECT PARTICIPATION, EXERCISE DESERT ROCK VII AND VIII

	OBSERVERS							TROOP UNITS							PROJECTS •								TOTAL PARTICIPANTS EACH SHOT
	ARMY	NAVY	CIV.	AIR FORCE	MARINE	CANA-DIAN	TOTAL	CDR	ARMY	NAVY	AIR FORCE	MARINE	CANA-DIAN	TOTAL	50.3	50.4	50.5	50.6	50.7	50.8	53.4	PROJECT TOTAL	
BOLTZMAN		74		63			137	176						176							34	34	347
FRANKLIN							0							0	25				3			28	28
LASSEN								205						205	25	5	4		3			37	242
WILSON	41		7	26	15		89	164						164	25	5	4	2	3	557	24	620	873
PRISCILLA	540	5	10	17	38	107	717	105				311		416	25	5	4	2	3	557	0	596	1729
DIABLO (misfire)	91	6	8	48		25	178	170				1703		1873	25	5	4	2	3	557	36	632	2680
HOOD	308	1	1	5		2	317	299				1517		1	25	5	4	2	2	557	36	631	2764
DIABLO II	586	3	8	9	28	7	621	81						81	25	5	2	2	2	557	46	639	1341
JOHN	30	1	2	38	11		82	17						17	25	5	2	1	2	557	0	592	691
KEPLER	708		11	25	8	108	857	88						88	25	5	2	1	2	557	30	622	1567
OWENS	77		3	1		24	105	21						21	25	5	2	1	2	557	0	592	718
STOKES	95		3				98	99	499				40	638	25	5	1	0	3	557	35	626	1362
SHASTA								9	11					20	25	5	1	0	3	557		591	611
DOPPLER	9			2			11	66	492					558	25				1	557	56	639	1208
* FRANKLIN PRIME								49	121				3	173	25				1	557	48	631	804
SMOKY	384	3	3	15	9	43	457	51	1104				40	1195	25				1	557		583	2235
GALILEO								18	177					195	23					105		128	323
WHEELER								12						12	23					105		128	140
LA PLACE								7						7	23					105		128	135
PIZEAU								10						10	28					105		133	143
NEWTON															28					50		78	78
RAINER															28							28	28
WHITNEY															28							28	28
CHARLESTON															28							28	28
MORGAN																							
SUB-TOTALS	2849	98	86	246	106	316	3666	1647	2404	0	0	3631	83	7665	684	66	30	13	34	7711	348	8772	20,103

* OBSERVED BY SMOKY OBSERVERS

• SAME PERSONNEL ACCUMULATIVE TOTAL

was used and the trenches were not occupied (Figure 4.2). In order to fulfill their training, the troops had witnessed Shot Doppler from trenches. An elaborate system of battlefield surveillance by television had been installed to bring the picture of the maneuver to News Knob for use of the press. However, this became ineffective when Plan B was used.

4.7.2 Project 50.2, Troop Observers. The controlling agency was the Deputy Exercise Director, Exercise Desert Rock VII and VIII. The purpose of the test was to provide orientation and indoctrination in the effects of atomic weapons. Pursuant to directives of the Commanding General, CONARC, that observers in Exercise Desert Rock receive training in conjunction with observation of an atomic detonation, the Exercise Director instituted the following program: (1) D-3, arrival of observers at Camp Desert Rock; (2) D-2, 8-hour preshot orientation course; (3) D-1 morning, observer orientation; (4) D-1 afternoon, trip into NTS to include tour of points of interest, briefing in the trench area and preshot visit to the equipment display area; (5) observers to see the shot on D-day, at approximately 1 to 3 hours after the shot observers were to make a postshot visit to the equipment display area; and (6) for those desiring it, a more detailed postshot analysis of damage in the equipment display area was presented by the Desert Rock instruction group. The program just listed entailed a dry run of the Desert Rock convoy on D-1. The following trenches, in compliance with CONARC safety standards, were constructed as part of the observer program:

Length	Coordinates	Map	Shot	Area
1,075 yards	927698	3	Priscilla	FF
1,500 yards	802082	1	Diablo	2B
1,500 yards	812067	1	Hood	9A
1,000 yards	785030	1	Kepler	4
Same as Hood			Shasta	2A
1,000 yards	847029	1	Doppler	7
1,630 yards	841118	1	Smoky	2C

The observer programs were planned for Shots Priscilla (Figure 4.3), Diablo, Hood, Shasta, Newton and Smoky. However, because of changes in the shot schedule, the bulk of the observers saw Shots Priscilla, Diablo, Hood, Kepler, Franklin Prime (open observer area) or Smoky. In addition, a group of approximately 200 troops from the 82nd Airborne Division witnessed Shot Galileo in the open and underwent a test of their reactions, administered by the Human Reactions Research Group. Equipment was displayed to observe atomic blast and thermal effects on Shots Priscilla, Hood, Shasta, and Smoky.

4.7.3 Project 50.3, Test of Radar Tracking of Atomic Clouds. The controlling agency for the test was the Chief Signal Officer, U.S. Army, who was responsible for the detailed planning, supervision of the test, and evaluation of test results. The purpose of this test was to study the tracking of radioactive clouds resulting from detonation of nuclear devices, using on-site operation of radar equipment. Additional related phases involved the proof testing of a fallout predictor model developed by U. S. Army Signal Engineering Laboratories and a study of fireball growth as detected by radar equipment. The following radar sets were used. All were mobile and self sufficient.

1. Weather Radar Set AN/CPS-9: to scan vertically each 3 seconds in the direction of the radioactive cloud. The set produced an RHI (Range Height Indicator) scope presentation, each scan of which was photographed. It gave the range, height and vertical cross-section of the cloud.

2. Modified Radar Set AN/APQ-13: to sector scan horizontally in the direction of the radioactive cloud at various elevations to produce a sector PPI (Planned Position Indicator) scope

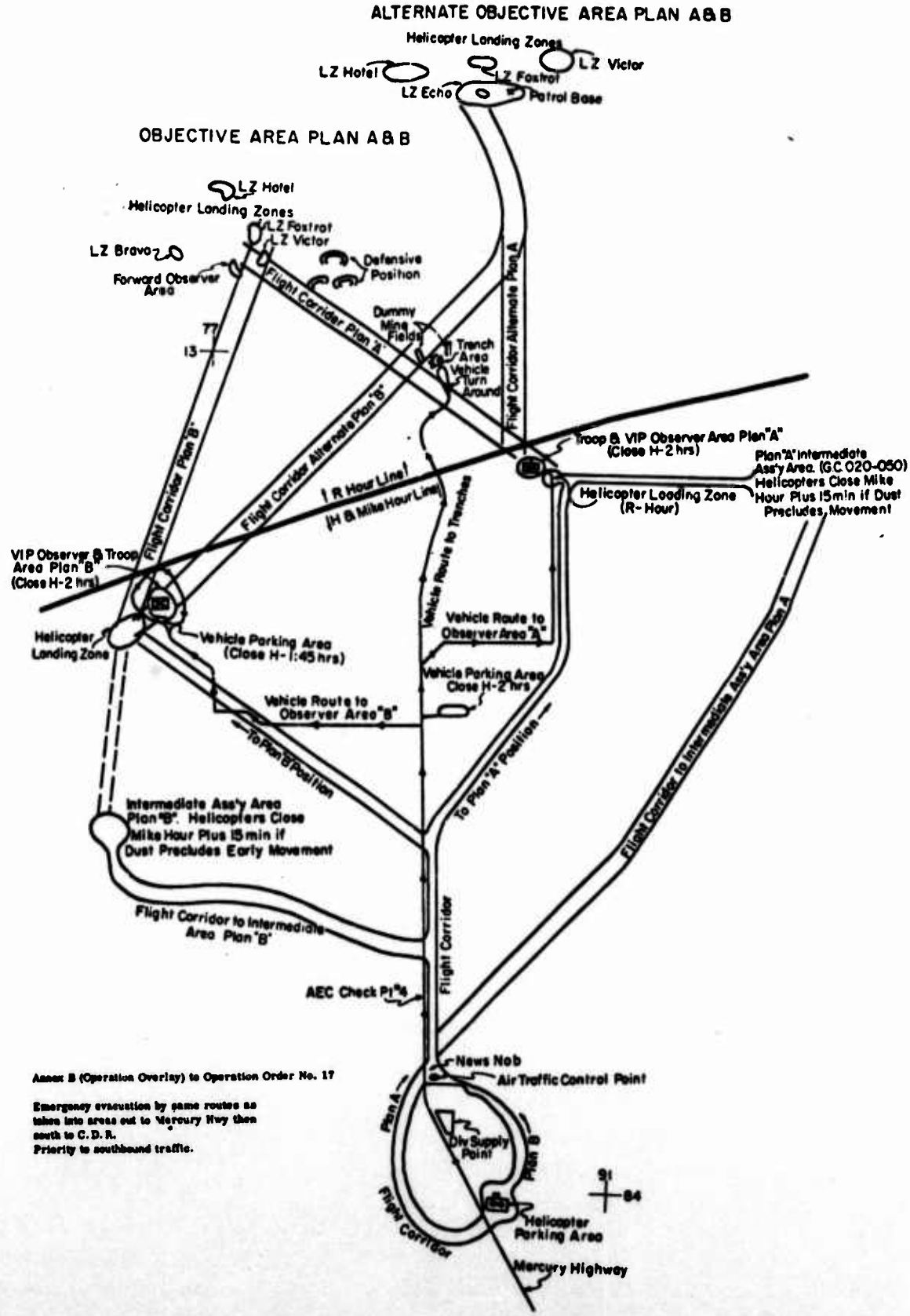


Figure 4.2 Project 50.1 Combat team exercise (infantry battle group test), Shot Smoky.

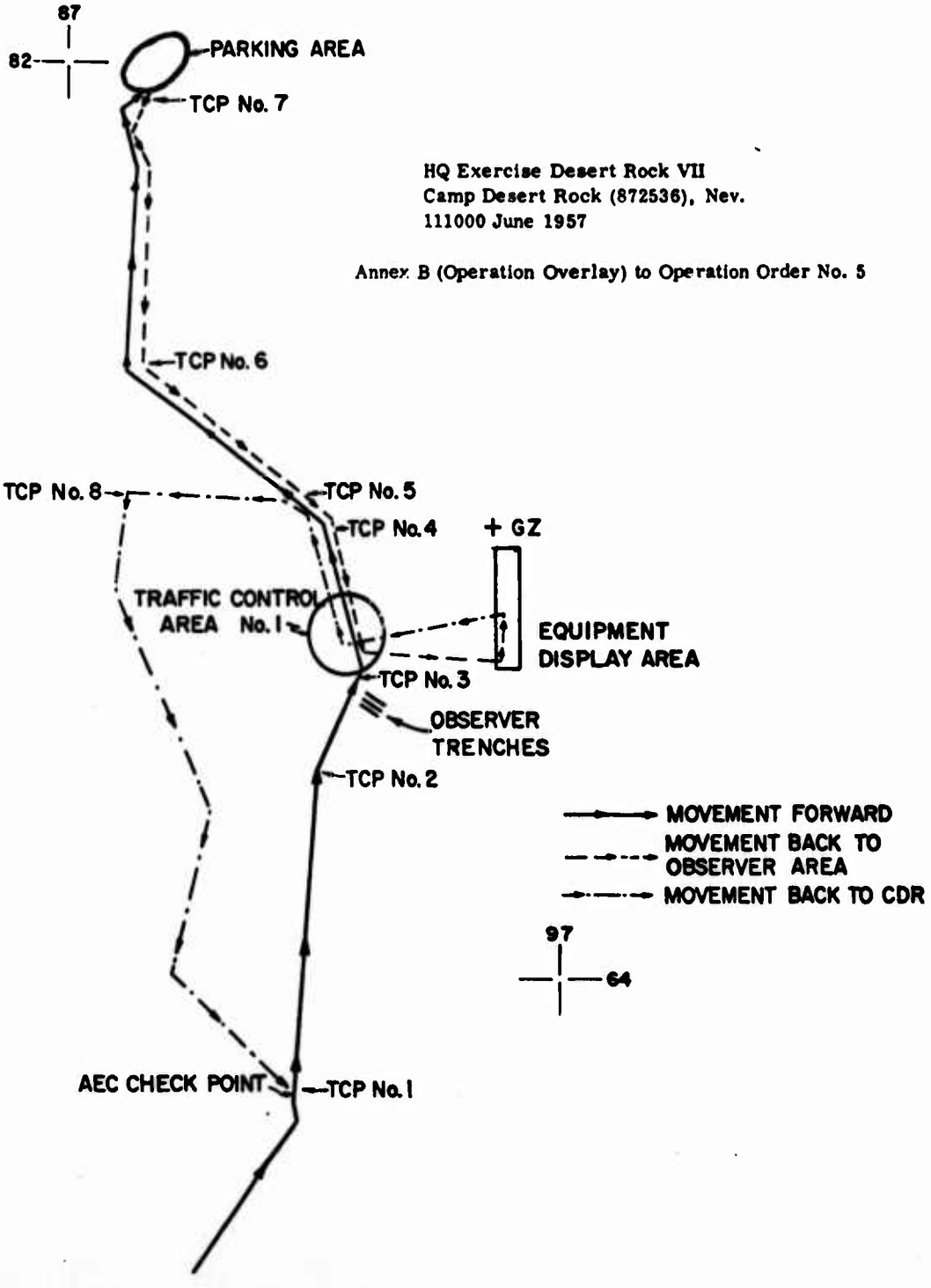


Figure 4.3 Project 50.2 Troop observers' test, Shot Priscilla.

presentation, each scan of which was photographed. From this radar the azimuth bearing of the AN/CPS-9 was determined. This set was compared to the AN/TPS-1D for optimum frequency evaluation.

3. Modified Radar Set AN/MPQ-1: to scan a 10-degree horizontal sector, 16 times per second, at an elevation to observe the fireball on a B scope presentation. This gave a high speed sector scan planned position indication for study of the fireball growth and yield.

4. Modified Radar Set AN/TPS-1D: to scan horizontally at various elevations to produce a PPI presentation, photographed at each scan. This set was compared with the 3 cm AN/APQ-13.

During the first phase of radar operation, all sets were located approximately 10 miles in line of sight of ground zero at Coordinates 893872 (Map 3). For the second phase the AN/CPS-9 was moved to a site approximately 35 miles from ground zero and located in the Emigrant Valley section of Lincoln County, Nevada. In a third phase of activity, the set was moved to a site about 100 miles from ground zero in Railroad Pass near Boulder City, Nevada. The fallout prediction group operated in an M-109 vehicle near the Air Weather Service Station in Mercury. This location gave reasonable access to the weather information available from the AWS group. This vehicle contained two teletype machines, a facsimile recorder and calculating and plotting equipment. The only construction accomplished for this project was improvement of the ground at Coordinates 893872 (Map 3) and the installation of power and utilities in the M-109 vehicle at Mercury. This project operated on all shots through Shot Newton from various line-of-sight positions at NTS. Their equipment was integrated into the overall frequency plan of the test organization but much interference was encountered between the AN/CPS-9 and M-33, Antiaircraft Fire Control System (which had been modified to position and track test aircraft), due, apparently, to similarity of characteristics of these two sets.

The purpose of the nuclear weapons locator test was to field test a breadboard model of a nuclear weapons locator and to determine the absolute time of detonation. This test was conducted at six off-site stations, three near Sandia Base, New Mexico, and three near Fort Huachuca, Arizona, with the administrative headquarters at Sandia Base.

4.7.4 Project 50.4, Evaluation of Water Decontamination Methods. The Chief of Engineers was responsible for the detailed planning and supervision of the test, and evaluation of test results. The purpose of the test was to study the solubility characteristics of radioactive fallout in water and to study the effectiveness of selected chemical coagulants in removing fallout from water. This project operated on Shot Priscilla only. Stations were set up within a 135-degree downwind sector on various lines of sight from ground zero. Pans, 30 inches square and 3 inches deep, were emplaced at these stations and covered until exposure for use. In addition, pans were buried on surrounding hillsides. Samples of dust from these pans were removed to a mobile laboratory at Camp Desert Rock for study.

4.7.5 Project 50.5, Field Evaluation of Shielded U.S. Army Corps of Engineers Heavy Equipment. The Chief of Engineers, U.S. Army, was responsible for the detailed planning and supervision of the test, and evaluation of test results. The purpose of the test was to determine the attenuation of heavy shielded engineer equipment in a large uniformly contaminated field and to evaluate the ability of operators to decontaminate land areas with shielded equipment. The shielded D8 dozer used in this test consisted of a standard D8 Caterpillar tractor fitted with an auxiliary lead cab within which the operator was placed. Figure 4.4 shows various cross-sectional views of the cab. All necessary controls were within the cab or accessible through an opening, and vision in all directions was provided by lead glass windows. A filter and blower provided the operator with a continuous source of uncontaminated air. Access to the cab was through a top-opening hatch. An exterior handle could throw the tractor into neutral in case of emergency. Integral radiac instruments indicated both the free field dosage and the dosage in the cab. This project planned to operate on Shots Wilson and Diablo but due to delay of Diablo,

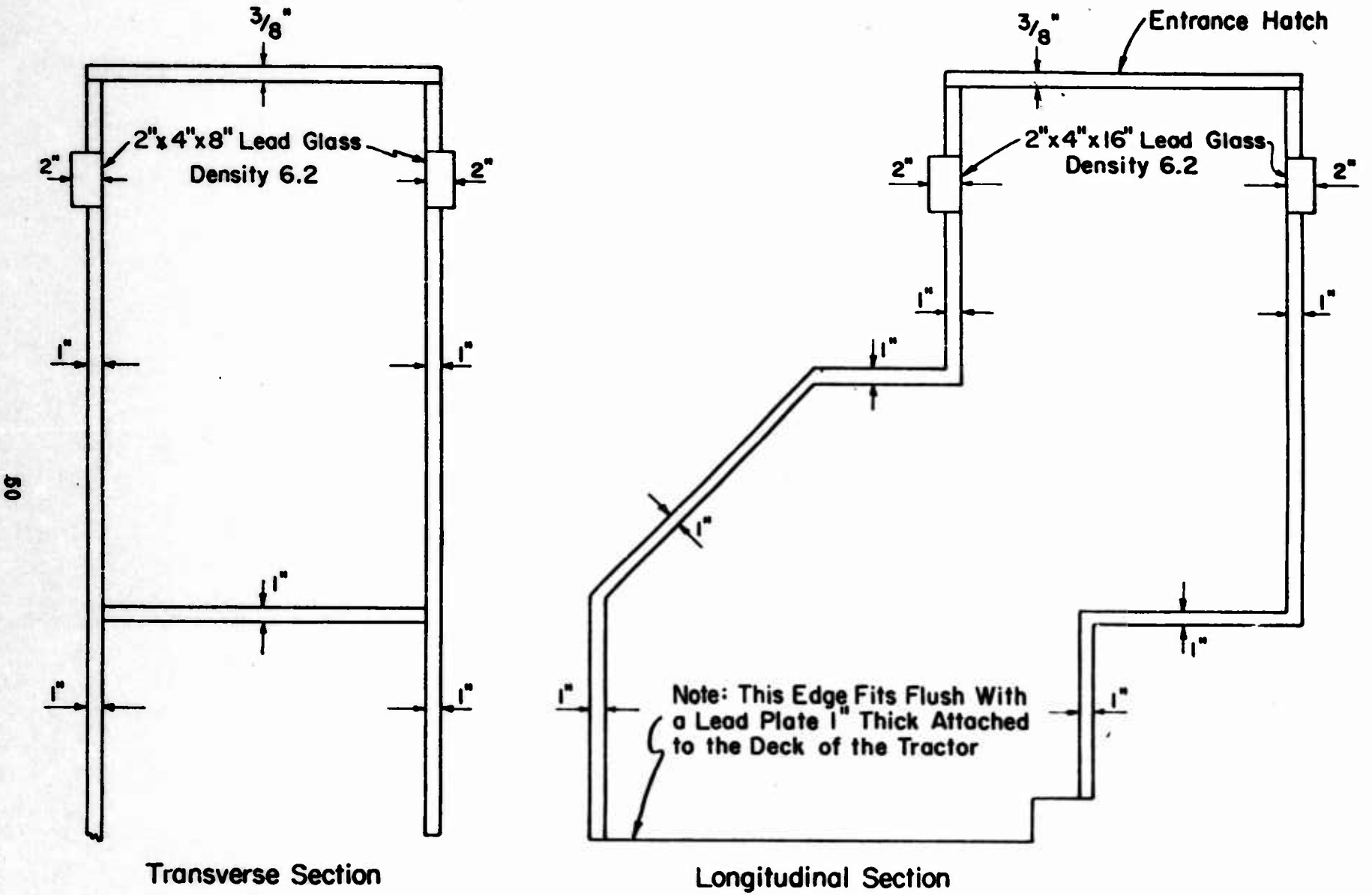


Figure 4.4 Cross-sectional view of lead cab for D8 dozer.

the vehicle was operated on Shot Wilson and in the contaminated area left by Shot Boltzmann. The dozer was made available to the test organization for use in clearing contaminated areas and was used with success for this purpose when needed.

4.7.6 Project 50.6, Test of Field Fortifications. The Chief of Engineers, U.S. Army, was responsible for the detailed planning and supervision of the test, and evaluation of test results. The purpose of the test was to determine the protection afforded by various types of field fortifications against atomic weapons effects. A total of 5 heavy timber machine-gun emplacements, 20 foxholes, and 2 hasty shelters were exposed to Shot Priscilla. Instrumentation to measure radiation (neutron flux and gamma) and air blast was established within the emplacements and the measurements obtained were compared with the incident surface readings at the same distances from ground zero. The instrumentation was provided and read by personnel from the DOD Test Group at Mercury, Nevada.

4.7.7 Project 50.7, Test of U.S. Army Ordnance Corps Materiel. The Chief of Ordnance was responsible for the detailed planning and supervision of the test, and evaluation of test results. The purpose of the test was to observe operability of various types of ordnance equipment under blast, thermal, and radiation effects of nuclear explosions. This test consisted chiefly of exposing ordnance materiel on various shots. It was closely coordinated with the DOD Test Group at Mercury which was studying similar effects.

4.7.8 Project 50.8, Detection of Atomic Bursts and Radioactive Fallout. The Chief Chemical Officer was responsible for providing radiological monitoring parties (three aerial and two ground) and a radiological monitoring control party complete with necessary survey equipment.

The Commandant, U.S. Army Artillery and Guided Missile School, was responsible for (1) preparation of a detailed plan of test; (2) conduct of the test under the supervision of the Exercise Director, Exercise Desert Rock VII and VIII; (3) providing field artillery units, personnel and equipment in support of the test; and (4) providing the test director for the coordination and control of the test.

The President, U.S. Army Artillery Board, was responsible for (1) preparation of the detailed plan of test for field artillery equipment; (2) conduct of that portion of the test which determined the suitability of field artillery equipment; (3) recommendations as to requirements for equipment to determine horizontal location, height of burst and yield of atomic bursts; and (4) recommending optimum organization required to utilize equipment referred to in Item 3.

The President, U.S. Army Air Defense Board, was responsible for (1) preparation of the detailed plan of test for antiaircraft artillery equipment; (2) conduct of that portion of the test which determined the suitability of antiaircraft artillery equipment; (3) recommendations as to requirements for equipment to determine horizontal location, height of burst and yield of atomic bursts; and (4) recommending optimum organization required to utilize the equipment referred to in Item 3.

The staff weather officer, CONARC (Commanding Officer, Second Weather Group) was responsible for providing an air weather detachment to furnish weather information and to assist in prediction activities. The purpose of the test was to determine the organization, procedures, equipment, and weather data required by U.S. Army units to predict radiological fallout, to confirm the accuracy of the prediction by monitoring actual fallout, and to determine horizontal location, height of burst and yield of friendly and enemy atomic explosions.

The objective of Task I was to determine: (1) the suitability of equipment organic to field artillery units, or available for user test, to obtain the horizontal location, height of burst, and yield of friendly and enemy atomic explosions; (2) the suitability of equipment, organic to antiaircraft artillery units, or available for user test, to obtain horizontal location, height of burst and yield of friendly and enemy atomic explosions; (3) the present capability of Army units to predict radioactive fallout using equipment organic or available for user test; and (4) the opti-

mum organization and procedures for utilizing the equipment referred to in Item 1. The objective of Task II was to determine: (1) the equipment required by Army units for accurate prediction of radiological fallout; and (2) the optimum organization and procedures (including prediction method) for utilizing the equipment referred to in Item 1 for the prediction of radiological fallout at division, corps, and field Army level. The objective of Task III was to determine specific requirements for weather data necessary to predict radiological fallout.

The U. S. Army Air Defense Board and U. S. Army Artillery Board effected suitable deployment of designated standard and developmental equipment. This equipment was tested in its capabilities for determination of atomic explosion yield, location and height of burst. CONARC arranged for the Second Weather Group, Langley AFB, to provide the minimum number of air weather service forecaster personnel necessary to provide the general weather evaluation, technical advice, information and assistance normally available from a tactical weather station to corps or division, and to assist in evaluation of the fallout prediction portion of the test. The Chemical Corps provided test personnel and instruments for monitoring radiological fallout. The U. S. Army Artillery and Guided Missile Center: (1) Provided a field artillery observation battery augmented by three artillery ballistic rawinsonde sections and additional personnel and communications. This unit was tested in its ability to provide, process and disseminate data required for fallout prediction while meeting normal requirements. (2) Provided that portion of a Fire Support Coordination Center (FSCC) and a Tactical Support Center (TSC) which would normally be available to assemble meteorological data, predict radiological fallout and evaluate techniques and personnel requirements for these functions. The FSCC-TSC utilized weather data normally available and burst yield location and height information produced as indicated above. Predictions were checked by the FSCC-TSC against radiological monitoring data furnished by the Chemical Corps. (3) Furnished necessary Army aviation.

Participating troops included: (1) one field artillery observation battery, TOE 6-577C, augmented by communications, survey, sound, flash and radar, personnel and equipment; (2) three field artillery meteorological sections, TOE 6-576C; (3) one tactical support center detachment; (4) one fire support coordination center detachment; (5) one Army aviation detachment; (6) one air weather service detachment; (7) six Chemical Corps radiological monitoring parties (three aerial, three ground); (8) one Chemical Corps radiological monitoring control party; (9) one U. S. Army Air Defense Board test and evaluation unit; (10) one U. S. Army Artillery Board test and evaluation group; and (11) one test director detachment.

Field artillery equipment tested included: (1) GR-8 sound ranging set, (2) AN/TVS-1 camera array, (3) M-65 BC scope (with filters) array, (4) AN/GAS-1 flash detection set array, (5) AN/MPQ-10 radar, (6) AN/MPQ-21 radar, (7) M-2 aiming circle (with filters) array, and (8) ballistic meteorological equipment. Antiaircraft artillery equipment tested included (1) AN/TPS-1G radar, (2) M-33 radar, (3) acquisition radar, Nike-Hercules, and (4) target-tracking radar, Nike-Hercules.

Radar positions were improved by leveling at the following sites: (1) Coordinates 749052, Map 1, (2) Coordinates 752048, Map 1, and (3) Coordinates 902873, Map 3.

This project operated on all shots from Wilson to Fizeau, inclusively. Sites were changed for each shot for most of the stations and the rad-safe monitors and helicopters operated as the situation permitted.

4.8 UNITED STATES NAVY, PROGRAM 51

For Project 51.1, Radiological Safety Monitor Training, the controlling agency was the Bureau of Yards and Docks, U. S. Navy. The purpose was to train personnel in field radiological safety monitoring for use at installations under the supervision of the Bureau of Yards and Docks. This project planned to operate on Shot Franklin but, because of delay of the detonation of the shot, project personnel were forced to return to home stations without witnessing the event. The personnel received limited training by monitoring the contaminated waste areas of the AEC at NTS.

4.9 UNITED STATES MARINE CORPS, PROGRAM 52

4.9.1 Project 52.1, Marine Brigade Exercise. The controlling agency was the Commanding General, Fourth Marine Corps Provisional Atomic Exercise Brigade. The purpose of the test was to provide command and staff training, emphasizing the evaluation of techniques relative to the exploitation of atomic fires and familiarizing personnel with effects of atomic weapons. The objectives were (1) to provide realistic training, particularly for command and staff personnel, in all phases of planning and conducting operations supported by atomic fires; (2) to test and evaluate the doctrine contained in Landing Force Bulletin No. 2; (3) to develop new tactics and techniques relative to the exploitation of atomic fires; (4) to familiarize personnel with the phenomena incident to an atomic detonation and the effects of the detonation on military equipment; and (5) to familiarize personnel with passive defense measures utilized against the effects of atomic weapons.

The field exercise was conducted in conjunction with Shot Hood, (Figure 4.5). The tactical maneuver involved the helicopter lifting of an infantry battalion which was attacking to seize an objective in exploitation of an atomic explosion. For safety reasons, the ground objective actually seized by troops was some distance removed from ground zero of the shot. Similarly, the helicopters making the lift were positioned on the ground at safe distances from ground zero and made their initial lift from a helicopter loading zone in the immediate vicinity of their original position commencing at zero time plus approximately 15 minutes. All subsequent helicopter trips were made from helicopter loading zones in the vicinity of the trench area to a landing zone in the vicinity of the objective. Ground troops participating in the exercise were supported by Marine VA jet aircraft and a Direct Air Support Center to control the aircraft operations. The ground troops occupied trenches at the minimum safe distance from ground zero. After the atomic explosion, part of the battalion landing team moved to helicopter loading zones in the vicinity of the trenches and one company initially moved as far forward toward ground zero as safety restrictions permitted, then proceeded to the helicopter loading zones. The remainder of the battalion landing team made a mechanized movement to the objective. Following completion of the ground maneuver, participating troops moved to the equipment display to view the results of the explosion on items of Marine Corps equipment.

A reduced-distance Command Post Exercise was conducted prior to the field exercise. The staffs of the units participating in the CPX were skeletonized and built around the Fire Support Coordination Center of the Marine Division and the Operations Section of the Marine Aircraft Wing. CPX participants moved to NTS at about 1400 hours on D−1 of the planned date of the field exercise, installed limited communications facilities, and erected necessary command post installations. Primary reliance for communications in connection with the CPX was placed on wire with emergency backup available by radio. The schedule of the CPX provided for the following events: (1) discovery of an enemy target suitable for atomic attack; (2) analysis of the target to determine the most suitable means for delivery of atomic attack; (3) request for delivery of atomic attack; (4) issuance of orders for atomic attack; and (5) delivery of attack and report of damage assessment.

Much digging was attempted in the area bounded by Coordinates 770080, 800080, 800090 and 770090 (Map 1) to provide 1,500 yards of trenches on Shot Diablo for the Marine maneuver, but due to rocky terrain, the trenches were finally constructed at 802082 (Map 1). When Diablo failed to detonate, the maneuver was transferred to Shot Hood and trenches constructed at 812066 (Map 1). Ground was improved at 734015 (Map 1) for the Command Post, where there was a telephone connection into the Mercury system. The U. S. Marine maneuver was originally planned for Shot Diablo, the rehearsal and CPX were run on the plan for Diablo, but the field exercise was conducted in conjunction with Shot Hood.

4.9.2 Project 52.2, Troop Observers. The controlling agency was the Commandant, U. S. Marine Corps. The purpose was to familiarize personnel with the phenomena incident to an atomic explosion and the effects of the explosion on military equipment. Approximately 100 to

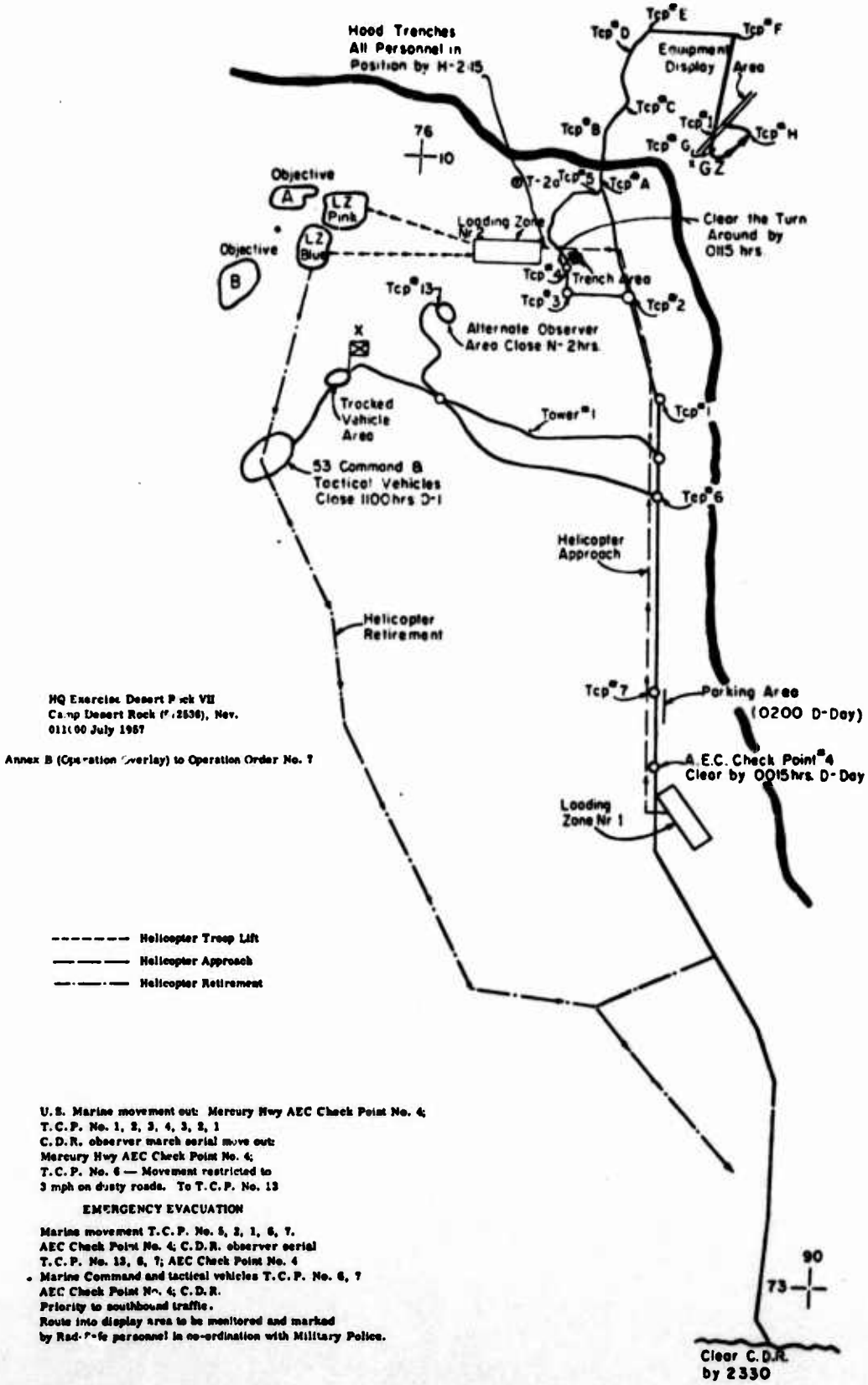


Figure 4.5 Project 52.1 Marine brigade exercise, Shot Hood.

150 U.S. Marine Corps officers were integrated into the observer schedule of U.S. Army Project 50.2. Most of the Marine observers saw Shot Priscilla from the trenches and a large percentage of the maneuvering troops observed Shot Priscilla from a hillside.

4.10 UNITED STATES AIR FORCE, PROGRAM 53

4.10 Project 53.3, Air Defense Command Aircrew Observers. The controlling agency was the Commanding General, Air Defense Command. The purpose was to indoctrinate members of Air Defense Command aircrews with the phenomena incident to an atomic explosion. Approximately 200 USAF ADC officers were integrated into the observer schedule of U.S. Army Project 50.2. Of the above, approximately 50 percent observed Shot John from a hillside and six observed from a spot directly beneath the point in space at which the device detonated.

4.10.2 Project 53.4, Radiological Defense Training. The controlling agency was Headquarters, 3415th Technical Training Wing (ATC). The purpose was to train U.S. Air Force passive defense personnel in radiological defense techniques. Participants were integrated into Project 50.2 as observers, and subsequent to the shot they proceeded to a predesignated area near ground zero where a contaminated air base was simulated. Here, monitoring operations were carried out utilizing jeeps and radio equipment for communicating with a control center. This project worked on Shots Boltzmann, Hood, Diablo, Stokes, Doppler and Owens with approximately 35 monitors on each.

4.11 CBR TEAMS PARTICIPATION

The controlling agency was the Sixth U.S. Army Chemical Section. The purpose was to train personnel from U.S. Sixth Army installations in radiological defense techniques. Participants were integrated into Project 50.2 as observers and subsequent to the shot they proceeded to a predesignated area where they studied monitoring techniques under the supervision of the Exercise Desert Rock radiological safety section. Ten CBR teams (approximately twelve men to a team) attended from Fort Huachuca, Arizona; Camp Hanford, Washington; Fort Mason, California; Sharpe General Depot, California; Seattle Army Terminal, Washington; and Sierra Ordnance Depot, California. They monitored Shots Boltzmann, Diablo, Kepler, and Shasta.

4.12 EXERCISE BOBCAT

The controlling agency of this exercise was the Canadian Administrative Group from Canadian Armed Forces. The purpose was to indoctrinate certain Canadian military personnel in atomic warfare and train certain Canadian radiological defense units.

Canadian personnel were permitted the following participation: (1) personnel of the Canadian Administrative Group (CAG) and Radiological Defense Units (RDU) witnessed shots attended by the Canadian participant group; (2) RCAF decontamination group conducted exercises under USAF sponsorship at Indian Springs AFB; (3) RDU conducted on-site monitoring exercises; (4) observers witnessed shots from trenches; (5) one platoon, Canadian Army, participated in the U.S. Army battle group exercise; and (6) a Canadian meteorologist was attached to the Weather Prediction Center.

Canadian observers were integrated into Project 50.2 on Shots Priscilla, Kepler, Owens, and Smoky. RDU teams participated on Shots Boltzmann, Diablo and Kepler. The Canadian Army Platoon took part in the exercise on Shot Smoky.

Chapter 5
OPERATIONAL TRAINING

5.1 GENERAL

A primary function of DOD Operations Coordination Group was to advise, assist, and establish necessary liaison with the Test Manager for Operational Training Projects, Desert Rock Troop Participation (see Chapter 4), troop observer programs, and the foreign observer program. See Figure 5.1 for Organizational Chart.

5.2 OPERATIONAL TRAINING PROJECTS

The primary aim of the DOD Operational Training Projects was the testing of service tactics and operation equipment and the training and indoctrination of military personnel. These projects were planned and conducted so as not to interfere with the AEC diagnostic and DOD Military Effects Tests. Table 5.1 is a summary of the planned and actual participation, by events, for the air projects.

5.2.1 Project Summaries, Air Projects. The following project summaries indicate the sponsoring agency and the purpose of each project.

Project 51.3—Navy Air Crew Indoctrination, Heavy Attack Wing Two, Crew Training. This project was established to provide an opportunity for AJ and A3D combat crews to observe an atomic detonation in the near vicinity of a burst. These aircraft were staged out of Naval Air Station (NAS), San Diego, California, and NAS, Whidbey Island, Washington. The aircrews were scheduled to participate in four events. Because of radio trouble the aircraft aborted on Shots Priscilla and Hood before reaching the test area. The project substituted three F9F-3 aircraft during Shot Smoky. Participation was successful.

The aircraft were to be flown on a simulated bomb run on a target offset from the ground zero position and were to execute a 135-degree escape maneuver to arrive at a position 5 miles from ground zero on a 180-degree true heading at H-hour.

Project 52.3—Marine Aircrew Indoctrination, Third Marine Aircraft Wing. This project was established to provide an opportunity for Marine combat aircrews to observe an atomic detonation in the near vicinity of an atomic burst. These crews were to participate in Shot Hood with A4D aircraft at 21,000 to 24,000 feet and R5D and R4D aircraft at 11,000 feet. The aircraft staged out of El Toro Marine Air Station, Santa Ana, California. Because of communication failure, the A4D aircraft aborted before entering the test area. The R4D/R5D aircraft successfully participated. The A4D aircraft were to orbit in a right-hand race-track pattern out of Lathrop Wells on an inbound heading of 45 degrees and were to be 16.5 naut mi from ground zero at H-hour, on a bearing of 150 degrees. The R4D/R5D aircraft were to be in a left-hand race-track pattern between Lathrop Wells and Desert Rock, 31 naut mi bearing 178 degrees true at H-hour.

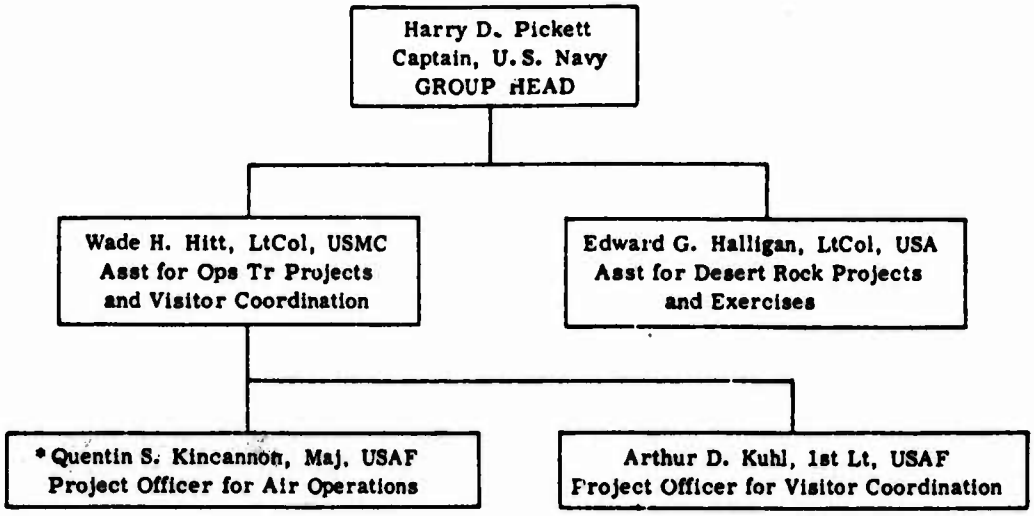
Project 53.5—USAF Air Defense Command, Aircrew Indoctrination. This project was established to provide an opportunity for Air Defense Command aircrew members and commanders to witness an atomic detonation in the near vicinity of the burst and to penetrate an atomic cloud. These aircraft were staged out of Indian Springs and Nellis Air Force Base and originated at the various installations throughout the Air Defense Command. F86-D, F89-H, F102, T-33 and a C-131 aircraft participated in the various events. The principal ADC participation was in Shot John where three T-33 type aircraft flew in formation with the delivery aircraft and interested ADC commanders watched the detonation from a C-131 aircraft positioned 15 naut mi south of ground zero in an east-west orbit at 12,000 feet MSL. In other events, air-

craft orbited over the Las Vegas VOR at an altitude 35,000 feet in a left turn until ordered to proceed by the sample controller into the atomic cloud. After cloud penetration, the aircraft proceeded to recovery bases.

Project 53.7—USAF Wright Air Development Center, Indirect Bomb Damage Assessment (IBDA). The objective of the project was the evaluation of IBDA equipment. This equipment was installed on an F89-D aircraft staged at Indian Springs Air Force Base. Several different flight patterns were flown for each event, although on each event data was obtained by the instrumentation as the aircraft was flying approximately 67 statute miles, horizontal range, from ground zero at an altitude of 35,000 feet.

Project 53.8—USAF Strategic Air Command, Crew Training. This project was established to test the suitability of Indirect Bomb Damage Assessment (IBDA) equipment and techniques insofar as possible under simulated bomb drop and actual burst conditions. The aircraft were to operate between 10,000 and 16,000 feet MSL and start their orbit at Indian

DOD OPERATIONS COORDINATION GROUP



* Replaced by Major John H. Pickering, USAF, for last 6 weeks of operation.

Figure 5.1 DOD Operations Coordination Group organization.

Springs using a right-hand race-track pattern orientated east and west, 35 naut mi short of ground zero on a heading of 360 degrees at H-hour and execute a standard breakaway maneuver. This project was to ascertain the effectiveness of the P-2 camera, A-5 control and the 0-15 scope cameras.

Project 53.9—USAF Tactical Air Command (Air National Guard Tactical Reconnaissance Units). This project was established to provide an opportunity for Air National Guard Tactical Crews to observe an atomic detonation in the near vicinity of a burst and make a damage assessment photo run over target. This project was participated in by several Air National Guard units on a rotational basis staging out of George Air Force Base, California. They flew a right-hand race-track pattern, Beatty to Lathrop Wells, inbound on a heading 127 degrees true to 31,000 feet to make a pass over ground zero at H plus 10 minutes at 10,000 feet. See Table 5.1 for participation.

5.2.2 Project Summaries, Ground Projects. The following project summaries indicate the sponsoring agency and the purpose of each project.

Project 53.2— The purpose of this project was to collect strong-

TABLE 5.1 AIR OPERATION TRAINING PROJECTS (PROGRAMED VERSUS ACTUAL)

Project Number	Project Agency	Mission	Type Aircraft	Boltzmann	Friscilla	Wilson	Lassen	Franklin	Coulomb A	Hood	Diablo	John	Kepler	Owens	Stokes	Shasta	Doppler	Franklin'	Smoky	Galileo	Wheeler	Coulomb B	Laplace	Fizeau	Newton	Rainier	Whitney	Charleston	Morgan
51.3	USN	Crew Training																											
		Fly by	AJ/A3D		2/0					2/0															2/2				
		Fly by	F9F																3/3										
52.3	USMC	Crew Training																											
		Fly by	A4D							2/1																			
		Fly by	F4D							2/2																			
		Fly by	R4D/R5D							1/1																			
53.5	USAF	Crew Training																											
	ADC	Cloud Penetration	F86D	6/5																									
		Cloud Penetration	F89H								6/0														2/0				
		Cloud Penetration	F102			6/2																							
		Cloud Penetration	T-33		6/2					6/4			5/5			5/0	5/0		5/0	5/0			1/1	2/6		3/6			
		Fly by										3/4																	
		Fly by	C131									1/1																	
		Fly by	C-54									0/1																	
53.7	USAF	IBDA																											
	WADC		F89D	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	0/1	1/1	1/1	1/1	1/1	1/0			1/0	1/0	1/0				
53.8	USAF	Crew Training																											
	SAC	IBDA	B47																2/2						2/2		2/2		
53.9	USAF	Crew Training																											
	TAC	Fly by Photo Mission	RF84F	2/2	2/2	2/2	2/2	2/2		2/2	2/2		2/2	2/2	0/2	2/0	2/2	2/2	2/2	2/2			2/0	2/0	2/0		2/2	2/2	

motion data concerning the amount of energy introduced into the ground from the detonation of nuclear devices.

Project 53.10—USAF Air Research and Development Command (Air Force Office of Scientific Research). The purpose of this project was to develop a passive means of detecting large scale disturbances in the upper atmosphere, such as might be caused by detonation of fission or fusion bombs, or by passage of supersonic or hypersonic vehicles or missiles.

5.3 MISCELLANEOUS ACTIVITIES

Operation Coordination Visitor Program. Operation Coordination had three visitor programs in effect during Operation Plumbbob: the Foreign Observer Program; AFSWP Visitor Program; and an observer program where personnel of the local bases, Indian Springs, Nellis and Lake Mead, could witness shots. This visitor program was coordinated and augmented with Joint AEC-DOD Visitors' Bureau personnel when required. Likewise, Operation Coordination personnel augmented the Joint AEC-DOD Visitors' Bureau at times when official observers were present at the Nevada Test Site.

TABLE 5.2 SUMMARIZATION OF FOREIGN OBSERVERS

Shot Boltzmann — North Atlantic Treaty Organization

31 visitors arrived, were briefed and toured the forward area.
18 visitors witnessed the detonation.

Shot Priscilla — British and Canadian Observers

25 visitors arrived, were briefed and toured the forward area.
25 visitors witnessed the detonation.

Shot John — British and Canadian Observers

17 visitors arrived, were briefed and toured the forward area.
17 visitors witnessed the detonation.

Shot Smoky — Inter-American Defense Board, Southeast Asia Treaty Organization and North Atlantic Treaty Organization

59 visitors arrived, were briefed and toured the forward area.
59 visitors witnessed the detonation.

Foreign Observer Visitors. Foreign observers, sponsored by the DOD, witnessed four atomic detonations during Operation Plumbbob. Foreign observer groups witnessed Shots Boltzmann, John, Priscilla, and Smoky (see Table 5.2).

Except for Shot Smoky, the visitors were billeted in Las Vegas hotels. Visitors for Shot Smoky were billeted at Indian Springs Air Force Base. The visitors were given extensive tours in the forward area of the test site and briefed on the operation by DOD personnel. Badging of the personnel was simplified by members of Federal Security, Incorporated, processing the badges and photography in rooms set aside by the management of the various hotels.

Chapter 6
SECURITY and CLASSIFICATION

6.1 GENERAL

The Security and Classification Office operated throughout the test period as the implementing and control agency for pertinent security directives during Operation Plumbbob. Operating in close coordination with the AEC, three officers and three enlisted men were responsible to the Deputy for Military Matters for all DOD security and classification matters associated with the test.

6.2 SECURITY

The primary mission of the DOD Security Office at the NTS was the requesting, issuing, and controlling of the NTS badge. This involved the posting of status reports, preparing appropriate security records, and recording of all DOD safes used for storage of classified material. The implementing of appropriate security directives for the internal security of personnel and projects within the DOD Compound was a further responsibility of the DOD Security Office. The DOD Security Office was also charged with the responsibility for the orderly movement of Desert Rock troop observers and participants into and out of the NTS.

6.3 CLASSIFICATION

Classification criteria as established in the AEC-DOD Classification Guide, OC-DOC 38, 23 August 1956 (SRD), and implemented by the AEC-DOD General Classification Guide for Continental Test Operations, OC-DOC 52 (SRD), and its unclassified extract, OC-DOC 53, were used. Classification was the responsibility of each individual originating or working with documents, reports, photographs, or other data and materials constituted classified information. It was the originator's further responsibility to establish the proper degree of classification by means of the above-mentioned guides (copies of which were furnished each DOD element at NTS) and to ascertain that all classified items were properly classified, marked, accounted for, and safeguarded at all times in accordance with applicable security directives. The DOD Classification Officer had offices located in Buildings 111, 101 and Quonset 3, and was available throughout the series to resolve any classification matters relative to DOD activities at the NTS.

6.4 AEC-DOD SECURITY AND BADGE OFFICE

On 1 April 1957, with the establishment of a joint AEC-DOD Security and Badge Office, it was jointly agreed that all personnel visiting the NTS who possessed a military clearance would be processed by the DOD Security Office. In addition to the nine scientific programs consisting of 56 projects with approximately 2,510 personnel, 1,500 personnel supporting DOD operations or the Test Manager's staff were processed.

6.5 MANNING OF AEC-DOD SECURITY AND BADGE OFFICE

During the operational period, between 1 April 1957 and 1 October 1957, the DOD Security Office was manned on an average of 12 hours a day, 7 days a week, with security representatives

on site during the entire period. By way of summarization of action accomplished by the DOD Security Office, with the assistance of the AEC, the following is a breakdown of badges and Desert Rock observers processed, by number:

Total NTS blue badges processed and issued (this figure includes remakes)	4,978
Total foreign observer badges issued	32
Total foreign participant badges issued	187
Total Desert Rock badges issued	3,958
Grand Total	9,155

The observer program of the series involved the escorting and the movement of convoys into the NTS as follows:

Desert Rock VII and VIII	11,500
Indian Springs Air Force Base	150
Kirtland Air Force Base	250
Lake Mead Base	50
Nellis Air Force Base	300
Grand Total	12,250

Chapter 8
AIR OPERATIONS

8.1 GENERAL

The Air Operations responsibilities of the Test Director for Operation Plumbbob were handled by a staff agency of the test organization. This differed from previous tests in which the Air Support Group performed the Air Operations functions for all NTS agencies.

Acting for the Test Director on all matters concerning air support for test programs, Air Operations was responsible for the following:

1. Acting as a coordinating agency for the Test Director and his subordinate units with the Air Support Group (4950th Test Group) on matters pertaining to: consolidation and submission of requirements, allocation of the support capability available, and coordination of all air participation activities within the NTS with the Test Director and staff to insure noninterference with the test program.
2. Advising the Test Director on feasibility and capabilities of satisfying air requirements.
3. Maintaining a current list of all air requirements and providing up-to-date information, by shot, to the Air Support Group.

To insure adequate air support, all subordinate units of the Test Director submitted requirements in status report form. These were consolidated and submitted to the 4950th Test Group, AFSWC, the unit responsible for providing the necessary supporting aircraft. Generally, these requirements included rad-safe surveys, aerial probe surveys, sample return, recovery, photography, air sampling, and special missions generated as the test series progressed.

For a detailed breakdown of type and total aircraft provided, missions performed, and organization of air support agencies, see separate report of the Air Support Group ("4950 Test Group (N) Final Report, Operation Plumbbob," SWC 75 46890, Secret).

8.2 CONCLUSIONS

It was concluded that the designation of an Air Operations officer as an integral part of the Test Director's staff was advantageous. This arrangement, as opposed to previous tests, allowed complete freedom of the Test Director in developing requirements and establishing priorities without regard to problems directly associated with the Air Support Group. Thus, possible conflicts of interest which might have arisen were avoided with the Air Operations officer assigned directly to the Test Director.

Further, it was concluded that the previous arrangement of utilizing members of the Air Support Group for performing the Air Operations functions of the Test Director would have been satisfactory had this been necessary.

8.3 RECOMMENDATIONS

It was recommended that future test organizations establish the Air Operations officer as a separate function from the Air Support Group if qualified personnel are available. If a qualified individual familiar with the overall functions and problems of the Test Director's mission is not available, it is more advantageous for the Air Support Group to perform this function.

Chapter 9
JOINT AEC - DOD VISITORS' BUREAU

9.1 GENERAL

The Visitors' Bureau for Operation Plumbbob was organized as a joint AEC and DOD activity directly under the Test Manager and was manned on a basis mutually agreed upon between AEC and DOD. Initial plans for the operation were formulated early in February 1957 between personnel of AEC's Albuquerque Operations Office and Field Command, AFSWP, Weapons Effects Tests (WET).

The Bureau was responsible for conducting the observer program and for coordinating it with other test activities. It was responsible for the reception, security, messing, billeting, transportation, rad-safe measures, observer areas, preshot and postshot tours, and orientation and briefing of official observers.

Briefings, tours, and transportation from Gate 100 to the forward area were provided for employee observers and for news media.

Briefings, tours, and transportation from Las Vegas to the test site were provided for Federal Civil Defense Administration (FCDA) observers.

Snack bars were set up at all observer areas for the convenience of the observers.

9.2 ORGANIZATION

The Bureau was staffed with AEC, AEC contractor, and DOD personnel to provide flexibility in operation. The successful execution of its mission was predicated on the full and timely cooperation and support from all agencies and full utilization of facilities at the test site (Figure 9.1).

9.3 OBSERVER CATEGORIES

The visitors (as distinguished from other personnel, i.e., project personnel, military staff observers, camp employee observers) fell into six general categories: official observers, employee observers, FCDA observers, news media observers, foreign observers, and special invitees of the Test Manager. Visitors' attendance statistics are shown in Table 9.1.

9.3.1 Official Observers. This group included Congressional, Civil Service, Army, Navy, Air Force, Marine, and other personnel considered to be of Very Important Person (VIP) status, attending the test by invitation extended by the Secretary of Defense, Chairman of the Atomic Energy Commission, or Chiefs of any of the three services. These persons, as a rule, were billeted at Indian Springs AFB and held a Top Secret or Q clearance.

9.3.2 Employee Observers. The employee observers were AEC employees, AEC contractor employees, and other persons not of VIP status, allowed by AEC to attend the test series. The observers were generally billeted at their own expense in Las Vegas, secured their own transportation to the test site, and were not permitted to participate in observation of Operation Plumbbob with less than a Q clearance.

9.3.3 FCDA Observers. These persons were invited by the FCDA to view the test series. They were billeted at their own expense in Las Vegas. Transportation to and from the test site was furnished by the bureau. These observers, generally, were uncleared and were placed in a separate observer area.

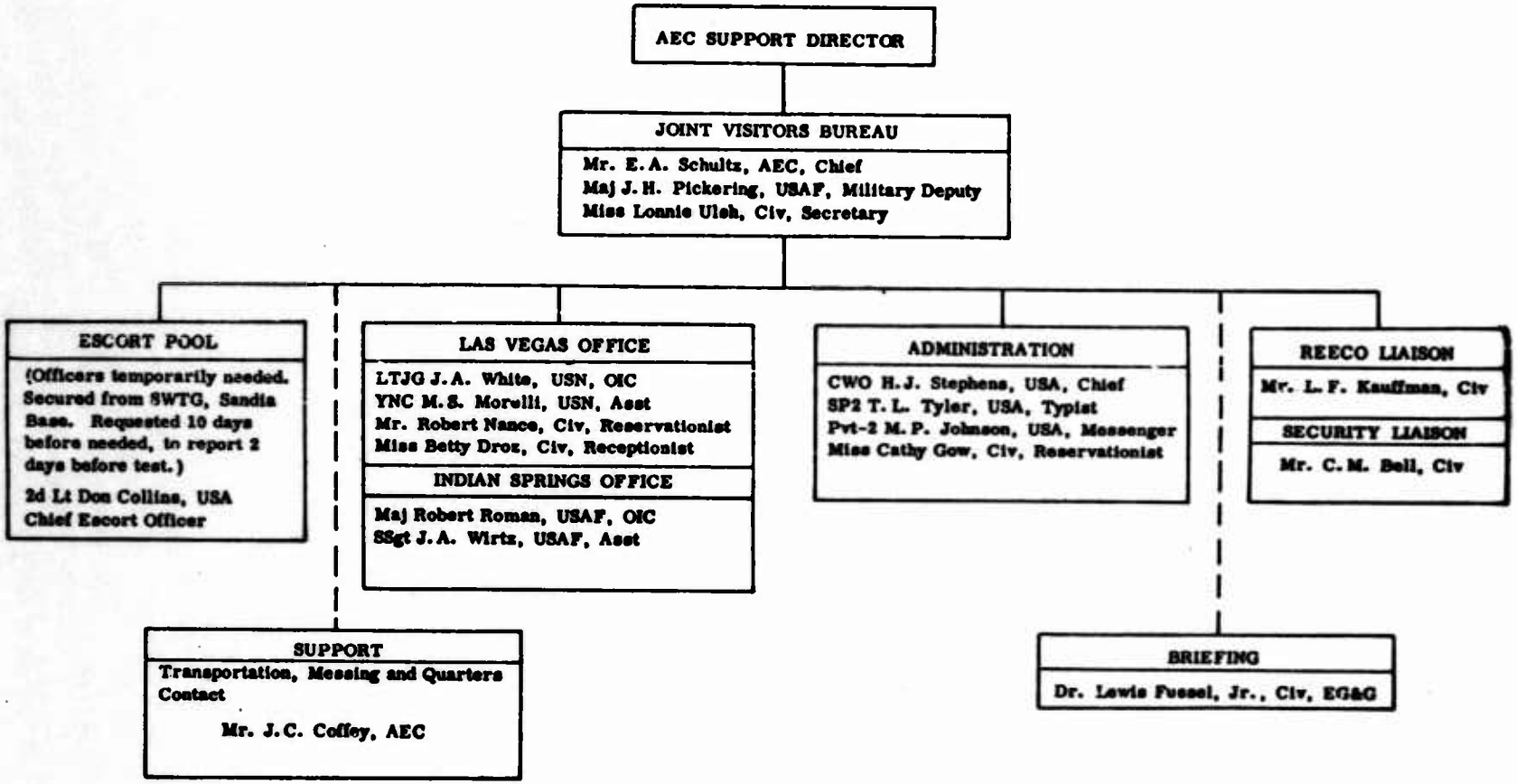


Figure 9.1 Visitors' Bureau organization.

TABLE 9.1 VISITORS' ATTENDANCE STATISTICS

Shot	Event	Date, 1957	Official Observers	Foreign Observers	Employee Observers	FCDA Observers	News Media Observers	Other
Boltzmann	Briefing	13 May	—	—	—	—	80	—
	and Tour	14 May	—	—	—	—	70	—
		15 May	—	29	16	53	80	—
	No Go	13-27 May	—	—	—	—	—	—
	Shot	28 May	—	14	—	9	47	300
Priscilla	Briefing	22 Jun	69	23	—	28	—	14
	and Tour	23 Jun	—	—	—	—	—	—
	Shot	24 Jun	68	21	—	28	—	407
Hood	Briefing	2 Jul	—	—	—	—	51	—
	and Tour	3 Jul	—	—	8	12	—	—
	No Go	4 Jul	—	—	—	—	—	—
	Shot	5 Jul	—	—	13	15	82	300
Diablo	Briefing	24 Jun	—	—	—	—	30	—
	and Tour	25 Jun	—	—	—	—	50	—
		26 Jun	—	—	8	33	65	13
		13 Jul	77	—	—	—	—	—
	No Go	27 Jun-14 Jul	—	—	—	—	—	—
	Shot	15 Jul	48	—	—	26	25	150
	Briefing and Tour	14 Jul	(Boy Scouts)					30
John	Briefing and Tour	18 Jul	208	—	—	—	25	—
	Shot	19 Jul	136	17	2	—	—	55
Kepler	Briefing and Tour	22 Jul	—	—	—	21	4	—
	No Go	23 Jul	—	—	—	—	—	—
	Shot	24 Jul	—	—	—	37	7	100
Stokes	Briefing and Tour	4 Aug	44	—	—	30	5	—
	No Go	5-6 Aug	—	—	—	—	—	—
	Shot	7 Aug	43	—	—	32	11	100
Shasta	Briefing and Tour	27 Jul	—	—	—	55	10	—
	No Go	29 Jul-17 Aug	—	—	—	—	—	—
	Shot	18 Aug	—	—	—	64	6	50
Doppler	Briefing and Tour	17 Aug	—	—	—	69	7	7
	No Go	18-21 Aug	—	—	—	—	—	—
	Shot	22 Aug	—	—	2	69	—	7
Franklin'	Briefing and Tour	14 Aug	—	—	—	—	4	—
	No Go	14-29 Aug	—	—	—	—	—	—
	Shot	30 Aug	—	—	—	—	—	58

TABLE 9.1 CONTINUED

Shot	Event	Date, 1957	Official Observers	Foreign Observers	Employee Observers	FCDA Observers	News Media Observers	Other
Smoky	Briefing and Tour	27 Aug	—	—	—	67	17	—
	No Go	27-30 Aug	—	—	—	—	—	—
	Shot	31 Aug	—	59	—	67	42	132
Galileo	Briefing and Tour	1 Sep	—	—	—	47	—	—
	No Go		—	—	—	—	—	—
	Shot	2 Sep	—	2	—	47	9	30
Wheeler	Briefing and Tour	5 Sep	—	—	—	—	—	--
	No Go		—	—	—	—	—	—
	Shot	6 Sep	—	—	—	—	—	—
Fizeau	Briefing and Tour	9 Sep	48	—	—	45	4	--
	No Go	9-13 Sep	—	—	—	—	—	—
	Shot	14 Sep	48	—	—	30	15	83
Newton	Briefing and Tour	9 Sep	—	—	—	32	4	—
	No Go	9-15 Sep	—	—	--	—	—	—
	Shot	16 Sep	32	—	--	20	26	—

9.3.4 News Media Observers. News reporters and photographers of all news services and radio and television stations were invited to participate in a number of open shots during the series. They were required to furnish their own billets and transportation to and from the test site entrance. Buses transported them to the forward area.

9.3.5 Foreign Observers. These persons were from various foreign nations and were sponsored at the Washington level by the DOD or FCDA. Special treatment was given these individuals. They were billeted at Las Vegas at their own expense (except for one group billeted at Indian Springs AFB), special tours were arranged for them, and they were transported to and from the test site by government transportation. These persons were cleared by their own governments and, in some cases, had U. S. clearances.

9.3.6 Special Invitees of the Test Manager. These persons were invited on an individual basis by the test manager at the request of the Military Deputy and various Program Directors. These personnel came from laboratories, universities, health services, mining groups, and other agencies which were directly concerned with various test programs and projects of Operation Plumbbob. Clearance requirements for these persons were commensurate with the needs of the project to which they were reporting.

9.4 OBSERVER AREAS

Suitable observer areas were selected and developed for visitor groups' use within the test site (Figure 9.2). Access to these areas on shot days was controlled in accordance with plans formulated between the Visitors' Bureau, Test Director, and Security. In preparation of these

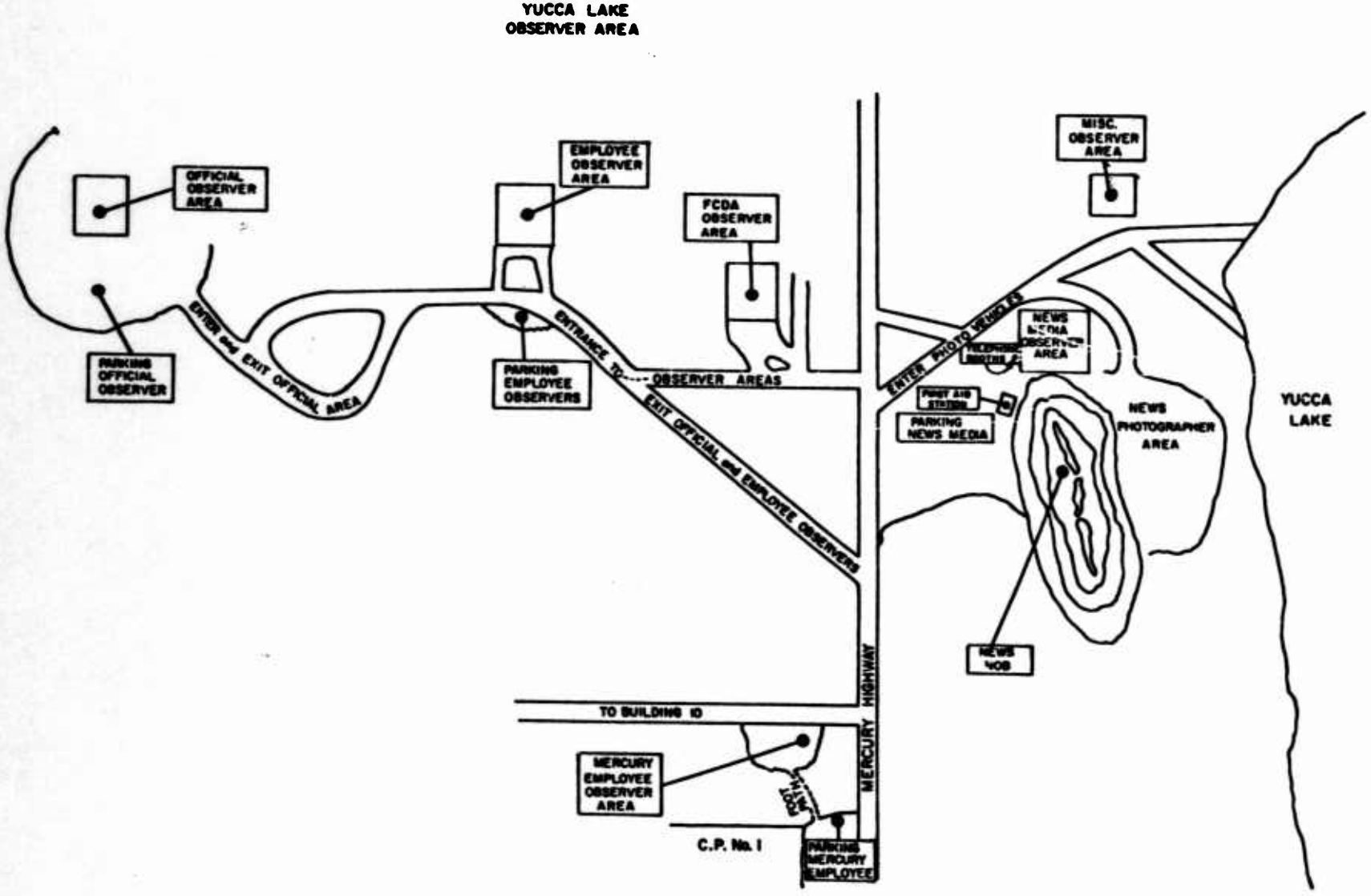


Figure 9.2 Yucca Lake observer area.

areas, the Visitors' Bureau was responsible, through the Reynolds Electrical and Engineering Company representative, for grading and fencing the roads giving access to the areas, installation of lighting systems and public address systems necessary for briefings, installation of coffee booths and water barrels, and necessary latrine facilities. High density goggles for viewing the fireball were issued on shot days.

9.5 BILLETING

Official and foreign observers were billeted at Indian Springs AFB, unless otherwise requested by them, in the Officers' Club billets. Accommodations were made available for approximately 131 persons.

When available, some quarters were furnished employee observers at the test site. However, because of the crowded condition at Mercury, few employee observers were billeted there. They were required to secure their own billets in Las Vegas, through the Las Vegas Branch Office of the Visitors' Bureau.

All other observers secured their own billets in Las Vegas, since no provisions were made for them at the test site.

9.6 MESSING

Except on special request, during preshot and postshot tours for official and FCDA observers, no messing facilities were made available to the observers. Arrangements were made with the Manager of the test site for the serving of coffee and rolls at observer areas during the preshot hour.

9.7 TRANSPORTATION

Because of the limited number of vehicles available, and as an economy measure, transportation was furnished only to official, foreign, and FCDA observers. Bus services were scheduled for programmed visitor activities at the test site and for recreational trips to Las Vegas.

9.8 SECURITY

An employee of the Federal Services, Inc., worked in close liaison between Visitors' Bureau and Security to ensure strict adherence to the AEC's visitor control procedures. Clearance data from each observer's home station were forwarded to the Visitors' Bureau with information copies to the Security Office. The Security Officer arranged for expeditious badging of visitors and checked clearances. The procedure of taking badge photos of official and foreign visitors with a polaroid camera upon arrival at Indian Springs AFB expedited their entry to the test site.

9.9 BRIEFINGS

The Bureau arranged programs which included appropriate briefings for all types of observers. DOD, AEC, CETG, and FCDA representatives explained their various programs to the visitors. Briefing periods were approximately 1 ½ hours long. In addition, official observer booklets containing information on past operations, the test site and surrounding area, and administrative details were distributed.

9.10 TOURS

Appropriate preshot tours of the test site were arranged for all observers. The Bureau conducted the tours for official, foreign, and employee observers and arranged for personnel to discuss participation of various groups, technical facilities, and test structures at appropriate points of interest in the forward areas. Postshot tours were arranged when conditions permitted.

In the event a shot was postponed, tours were conducted to Hoover Dam and other points of interest for the official and employee observers.